

The Iron Age

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A New Emery Grinder.

We show in an engraving which we annex a new emery grinder with a surface-grinding attachment, put on the market by the Diebel Mfg. Company, of Philadelphia, Pa.

The general arrangement of the tool is well shown in the cut, and requires little further explanation. The surface plate measures 9 x 14 inches, and for grinding die plates, flat irons, spirit levels, lock fronts and all other work where perfectly true flat surfaces are required will be found of great convenience. It is so arranged that it can be quickly thrown back when not in use. In the machine itself provisions are made for taking up all side motion, enabling the wheel to run perfectly true. This is a feature of very great importance. Bearing protectors are, moreover, provided which not only keep the emery dust from the journals, but also the oil from penetrating the emery-wheels. These, when saturated with oil, become worthless, hence the value of the protectors. The machine which we show is known as No. 3 Grinder.

New Double-Surfacing Machine.

We illustrate on this page a new double cylinder surfacing planer, built by the Egan Company, 179-199 West Front street, Cincinnati, Ohio. The machine is claimed to embody a number of features presenting important advantages over other designs, and to carriage and furniture factories, planing mills and workers of hard wood in general will prove of interest.

The bed is dove-tailed into the frame, and is gibbed in a very superior manner. The lower head is on the bed, and has an independent adjustment. It can be raised and lowered with the bed, or raised and lowered independently by a crank-handle underneath. The outer end of the bed can also be raised and lowered independently to suit the cut being taken, and the part of the bed outside the head can be swung out of the way, giving free access for setting knives. The upper main head is of steel and is double belted, and runs in large, self-oiling journal boxes, lined with Babbitt. The feed consists of four powerful geared feed rolls. There are no expansion links on this machine. The pressure bars are on each side of the knife and come very close up, enabling the operator to do the smoothest work. The machine will plane 26 inches wide, both sides, and 6 inches thick.

Fog Signals.

During the old days of sailing vessels, when the duration of voyages was so uncertain, sound signals as aids to the mariner were but little demanded. The seaman on approaching the coast in fog trusted entirely to his lead, and when he found circumstances favorable for doing so he anchored his vessel until the atmosphere cleared. But since the application of steam to navigation, with keener competition in trade, these conditions have been entirely changed. The modern steam vessel is expected to keep time with nearly the same degree of precision as a railway train, and it is evident, even with the utmost care and attention on the part of her commander, this requirement cannot possibly be fulfilled, and collisions and strandings must occur, unless efficient sound signals for fog be carried by each vessel, and powerful signals of this class be provided at lighthouse and light-vessel stations. These circumstances have led to a rapid development of fog signals both ashore and afloat, there being now about 700 of these signals of various descriptions on the coasts of the world. We therefore find, as might have been naturally expected, that coast fog signals have been made by lighthouse authorities the subject of careful experiment and scientific research, but, unfortunately, the practical results thus far have not been so satisfactory as could be desired.

In an address delivered at the last meeting of the British Association for the Advancement of Science Sir James N. Douglass explained that this was due very largely to the very short range of the most powerful of these signals under occasional unfavorable conditions of the atmosphere during fog, and also to the present want of a reliable test for enabling the mariner to determine at any time how far the atmospheric conditions are against him in listening for the anxiously expected signal. In 1854 some experiments on different means of producing sounds for coast fog signals were made by the engineers of the French Lighthouse Department, and in 1861-62 MM. Le Gros and Saint Ange Allard, of the Corps des Ponts et Chaussées, conducted a series of experiments upon the sound of bells and the various methods of striking them.

In 1863-64 a committee of the Elder Brethren of the Trinity House, England, made some experiments at Dungeness upon various fog signals. In June, 1863, a committee of the British Association memorialized the then president of the Board of Trade, with the view of inducing him to institute a series of experiments upon fog signals. The memorial, after briefly setting forth a statement of the nature and importance of the subject, described what was

then known respecting it, and several suggestions were made as to the nature of the experiments recommended. The proposal does not appear to have been favorably entertained by the authorities to whom it was referred, and the experiments were not carried out. In 1864 a series of experiments was undertaken by a commission appointed by the Lighthouse Board of the United States to determine the relative powers of various fog signals which were brought to the notice of the board.

In 1872 a committee of the Trinity House visited the United States and Canada, with the object of ascertaining the actual efficiency of various fog signals then in operation on the North American Continent, about which very favorable accounts had reached

ders tested were, first, fine grain; second larger grain; third, rifle large grain, and, fourth, pebble. The result placed the powders exactly in the order above stated; the fine grain, or most rapidly burning powder, gave indisputably the loudest sound, while the report of the slowly burning pebble powder was the weakest of them all. Experiments were also made with the object of ascertaining the relative value of the sound produced by the explosion of varying quantities of gun-cotton. Here again the greater value of increased rapidity of combustion in producing sound was clearly demonstrated. It was found that charges of gun-cotton yielded reports louder at all ranges than equal charges of gunpowder, and further experiments proved that the explosion

SCIENTIFIC AND TECHNICAL.

Chalk Formation by Sea-Weeds.

We find that attention is directed to some observations which are said to have been made in the Mediterranean Sea of the manner in which chalk is formed by sea-weeds. The *lithothamnium* of the Bay of Naples were specially studied. They grow at depths of from 100 to 300 feet, a class of algae remarkably poor in organic matter, but rich in mineral constituents, among which carbonate of lime is preponderant. They grow to be as large as the hand, and then die without suffering change of form by decomposition. Living plants attach themselves to dead ones, and thus extensive deposits

the east, in which they had at the same time inclined toward the south. Two bottles and one keg were found at the Azores, the bottles in positions which showed that they had taken 53 days to travel a distance of 420 miles, and the keg where it seemed to show that the floats were continuing their course toward the south. The positive, though partial, results thus obtained appear to establish the fact that, from the latitude in which the floats were thrown overboard, not a drop of the surface water of the Atlantic reaches the coast of France.

Japanese Art Metal.

In his lecture at the recent British Association meeting in Birmingham, England, Prof. W. C. Roberts-Austen, chemist of the Mint, referred to some of the typical alloys employed by the Japanese in their metal art work. The first of these is called "Shakudo," and consists of 94.50 per cent. of copper, 1.55 per cent. of silver, 3.73 per cent. gold, 0.11 per cent. lead and traces of iron and arsenic. Another variety of it contains 95.77 per cent. copper, 0.08 per cent. silver and 4.16 per cent. gold. This alloy has been used for very large works of art, such as colossal statues. The quantity of gold in it is very variable. The next alloy mentioned was "Shibuichi," and its composition is copper, 67.31 per cent.; silver, 32.07 per cent.; iron, 0.52 per cent. and traces of gold. Another variety of it consists of copper, 51.10 per cent.; silver, 48.93 per cent.; gold, 0.12 per cent. In the first of these alloys the gold is said to produce a rich purple coat or patina when treated with a pickling solution. The shibuichi has a peculiar silver gray color of its own, to which Japanese artists are very partial. These alloys have many varieties, and they are also combined. Mottled work is produced by pouring two alloys of different tint together at the solidifying point of the less fusible one, so that the alloys unite, but do not blend. The gold and silver is only used to lighten the effect in some way. There are three solutions generally in use, according to the inquiries of Professor Roberts-Austen. They are made up respectively in the following proportions and used in a boiling state:

	I.	II.	III.
Verdigris.....	438 grs.	87 grains.	230 grains.
Sulphate of cop.....	252 "	487 "	540 "
Niter.....	252 "	487 "	540 "
Common salt.....	252 "	146 "	540 "
Sulphur.....	252 "	233 "	540 "
Water.....	1 gal.	233 "	1 gallon.
Vinegar.....		1 gallon.	15 fluid drams.

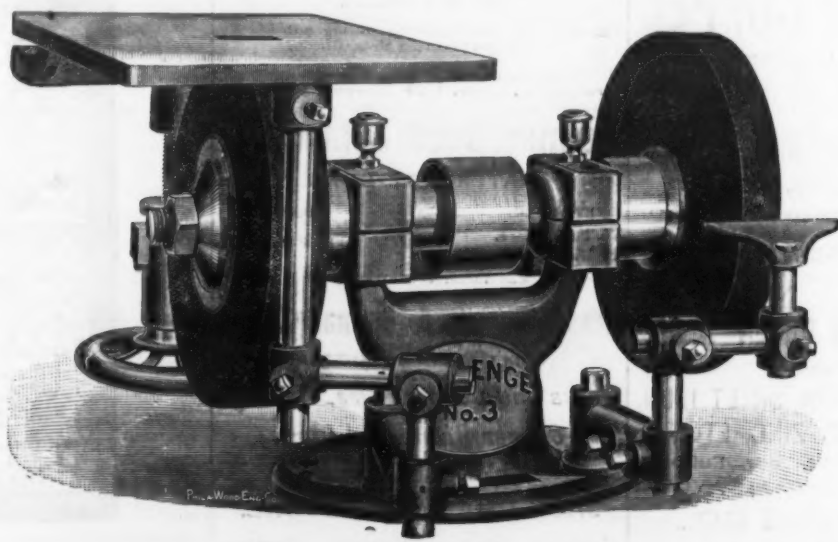
That most widely used is No. I. Pure copper when used boiled in No. III. turns a brownish red, and shaku-do turns purple. The varied colors of Japanese metal-work, in short, are the result of alloys or impurities in the metal, and the action of pickles.

Galvanic Action and Expansion in the Bartholdi Statue.

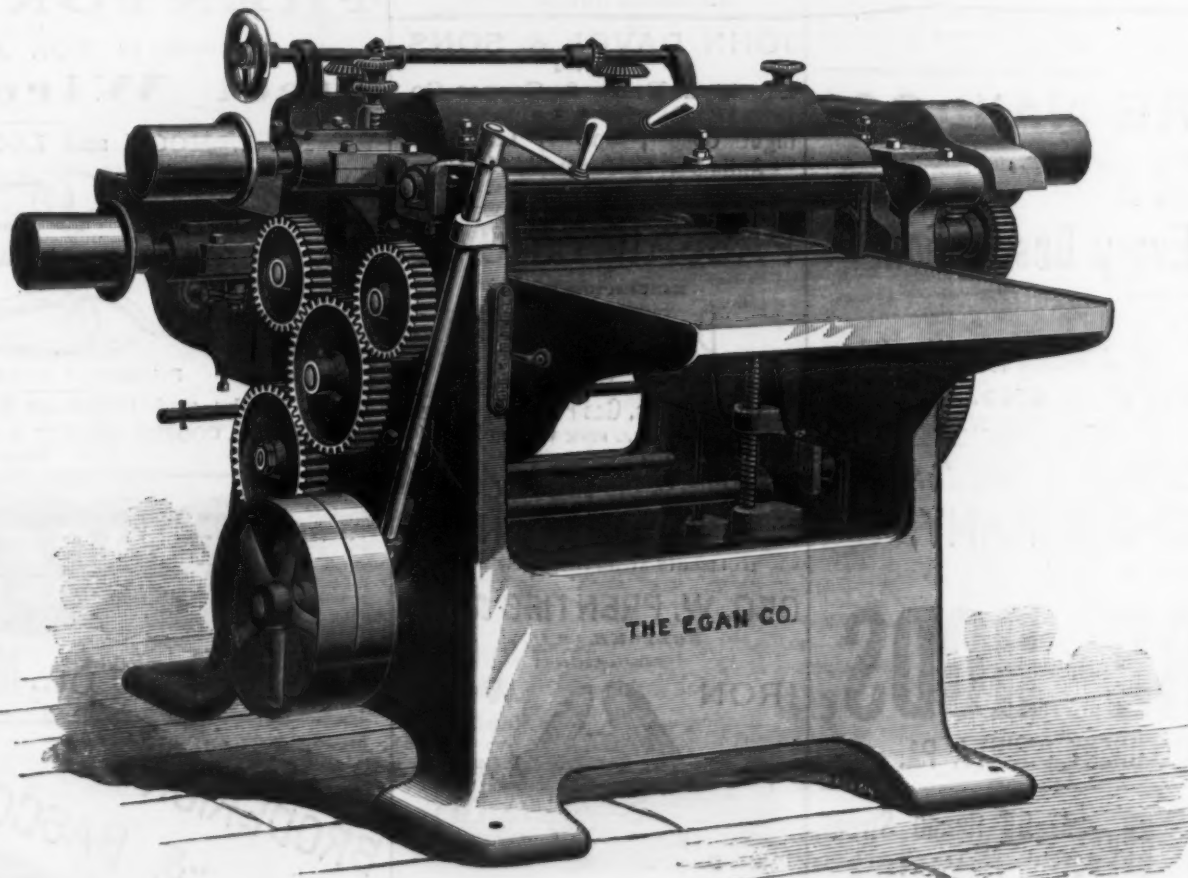
In order to protect the Bartholdi Statue against galvanic action an ingenious insulation of the copper from the iron framework has been employed, the insulating material used being asbestos cloth soaked in shellac. The device has been managed so cunningly that in no place do the two metals come in contact with each other. It was at first feared that the durability of the statue would be threatened by the great expansion and contraction it would be subjected to under different temperatures, thereby wearing out the copper rivets, or even straining the frame. Experience so far has shown that the mottled or corrugated surface, due to the hammering the copper had received, has prevented much of the expansion that the direct rays of the sun would otherwise have caused. No two contiguous parts received the same amount of heat, and the expansion in midsummer was found to be much less than had been feared. Whether expansion and contraction will eventually produce a serious injury of any kind cannot now be decided, but the indications are not at all alarming.

Utilizing the Residual Liquid of Bichromate Batteries.

M. Desruelles, of Paris, impressed with the fact that the residual liquid of bichromate batteries retains sufficient energy to be used in weaker batteries, has sought to utilize it by an interesting process of converting it into convenient and marketable shape. The transportation of the spent liquid of bichromate batteries charged with corrosive substances and acid is not convenient, and hence to solve the question in a practical way the liquid is subjected to a treatment by which its active portions are converted into a solid in the following manner: The residual liquids are mixed in suitable proportions with any acid-proof and porous substance capable of forming a paste with it. The material found to yield the best results is kieselguhr, a diatomaceous earth, or earth composed of the remains of diatoms, and consequently consisting entirely of almost pure silica. This paste is afterward dried, either by natural evaporation or by vaporizing the water which it contains by the application of heat, and is then divided into cakes, each containing a sufficient quantity of the chemicals to charge a cell or element of a telegraphic battery. When the cakes are dry they can be very conveniently con-



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this country. Among other instruments they witnessed the performance of a siren apparatus patented by Messrs. A. & F. Brown, of New York. One of these instruments was in 1873 sent to the Trinity House by the United States authorities, and tested with other instruments in the experimental trials at the South Foreland in 1873-74. This investigation was carried out at the South Foreland by the Trinity House, with the object of obtaining some definite knowledge as to the relative merits of different sound-producing instruments, and also of ascertaining how the propagation of sound was affected by meteorological phenomena. These experiments were extended over a lengthened period, in all conditions of weather, and the well-known scientific and practical results obtained, together with the ascertained relative merits of sound-producing instruments for the service of the mariner, are of the highest scientific interest and practical importance.

The investigation at the South Foreland was followed up by the Trinity House by further experiments, in which they were assisted by the authorities at Woolwich, with guns of various forms, weight of charges and descriptions of gunpowder. The pow-

er of $\frac{1}{2}$ pound of gun-cotton gave a result at least equal to that produced by 3 pounds of the best gunpowder. These results led the Trinity House to adopt this explosive as a fog signal for isolated stations on rocks or shoals, where previously from want of space nothing better than a bell could be applied. It is also applied with success to light-vessels. But wherever the siren can be installed it is found to be the most efficient fog signal yet known, chiefly in consequence of the prolongation that can be given to its blasts, and the ease with which it can be applied with any amount of motive-power available to the production of any desired combination of high and low notes for distinctions corresponding with those of white and red or short and long flashes of light, and thus affording the required individuality of each station. The experience, however, with the most powerful fog signal is not at present to be considered altogether satisfactory. With siren blasts absorbing about 150 horsepower, or nearly 5,000,000 foot-pounds, per minute during the time they are sounding, the signal is occasionally not heard, under some conditions of fog and wind, beyond 1 mile, while at other times it is distinctly heard above 10 miles.

are formed. Beds of pure, uncrystallized chalk remain after the gradual disappearance of the organic matter, the vacancies left by which are gradually filled with calcareous substance. Beds of chalk thus formed may, under some conditions, attain great thickness.

Surface Currents of the Ocean.

Some experiments have recently been made by Prof. G. Pouchet, under the patronage of the Prince of Monaco, with relation to the superficial currents of the ocean. The purpose was to determine the existence of a current that might carry warm weather to the coast of Europe. Ten copper spheres, 1 foot in diameter, 20 kegs, like beer-kegs, and 150 well-corked bottles, all bearing requests in several languages, to be taken care of by the finder, were carried to the Azores and dropped on the 27th and 28th of July, 1885, on a line about 170 miles long and running 14° north by east. It was supposed that, if any of the floats reached the coast of Europe, it would be at between 40° and 50° north latitude; but none of them have yet been seen in those regions. Three of the floats were taken up after a travel toward

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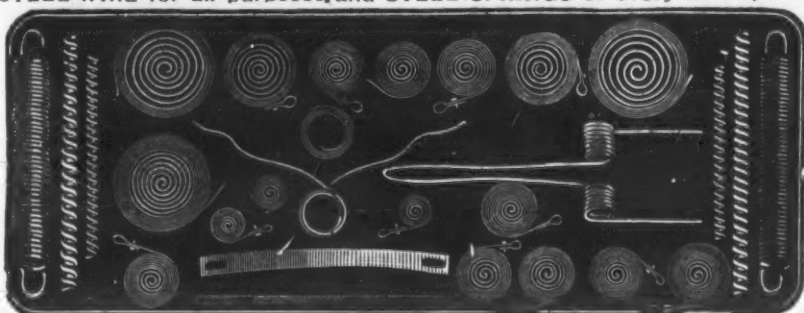
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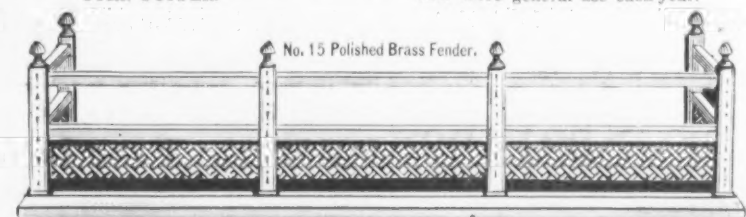
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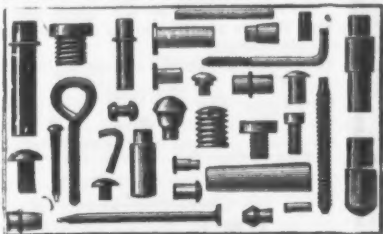


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veyed to the places where they are required. The materials may be supplied either in the form of cakes or blocks or in the condition of dust or powder, if previously reduced to this latter state. In order to use them they are simply placed in the bottoms of the cells or elements, which are then filled up with pure water. The water dissolves the acids and salts contained in the cakes, and the acid-proof and porous material settles at the bottom of the element.

Effect of Impurities in Gold Alloys.

The way in which an alloy of gold and copper is effected by a small quantity of impurity presents one of the most serious difficulties in working gold. It has been known since the seventh century that minute quantities of certain metals render gold brittle, and in a recent lecture at Birmingham, England, Prof. Austin Roberts said, "It may be well to demonstrate the fact. Here are 200 sovereigns. I will melt them and will add in the form of a tiny shot a minute portion of lead amounting to only the 2000th part of the mass, first, however, pouring a little of the gold into a small ingot, which we can bend and flatten, thus proving to you that it is perfectly soft, ductile and workable. The rest of the mass we will pour into a bar, and now that it is sufficiently cold to handle, you see that I am able to break it with my fingers, or at least with a light tap of a hammer. The color of the gold is quite altered, and has become orange-brown, and experiments have shown that the tenacity of the metal—that is, the resistance of the gold to being pulled asunder, has been reduced from 18 tons per square inch to only 5 tons. These essential changes in the property of the metal have been produced by the addition of a minute quantity of lead."

Glow Lamps.

At one of the recent meetings of the British Society of Arts Major Gen. C. E. Webber gave a paper on glow lamps, in which he gave the results of his observation as to the best method of arranging them. He said that, as the surface of the filament is so much smaller than that of a gas flame, its brilliancy when giving an equal light is such that it produces a sudden slight paralysis of the receptive powers of the eye. The result is that persons often complain of the want of light in a room fitted with glow lamps, although the illumination is actually greater than it would be with gas. The remedy for this is that glow lamps should be invariably shaded from the eye and be placed as near as possible to the object to be seen. General Webber also described the manufacture of glow lamps, mentioning incidentally that the filament of the Victoria Brush lamp is made by requiring a viscous solution of cellulose into a precipitating solution, a process which produces the most perfect uniformity of section.

Fluorescence of Bismuth.

Engineering says that sulphate of bismuth, according to M. de Boisbaudran, does not fluoresce in a vacuum when submitted to the action of the electric discharge; but when mixed with sulphate of calcium it gives out a fine reddish orange fluorescence. Sulphate of bismuth with sulphate of strontium gives a bright orange fluorescence, and with carbonate of strontium a blue light. With sulphate of magnesie sulphate of bismuth gives an orange fluorescence. M. de Boisbaudran has applied this method to the discovery of traces of bismuth in a number of chemical products and reagents of the laboratory, several of which were reported to be pure.

The Temperature of the Deep Sea.

The president of the British Association, at the recent Birmingham meeting, having mentioned a sort of law which M. Faye, the French physicist, has stated, to the effect that the terrestrial crust cools more rapidly under the sea than under land, M. Faye has written to the French Academy of Sciences, pointing out that he has referred especially to seas communicating with one or the other pole, and whose deepest layers are at temperatures near to zero. He adds that the phenomenon remarked in seas which do not communicate freely with the poles is not the less existent. The temperature then also decreases with the depth, and the difference between these layers and those of continents at the same depths is also great, namely, about 15°.

Durability of Raft Timber.

Raft timber that has been floated down rivers has been ascertained to be no longer liable to the attack of dry rot. So much so is this said to be the case that in Alsace it is customary to specify that only raft timber shall be employed. The water slowly dissolves out the albumen and salts, and thus deprives the fungus of the nutriment needful for its development. A French investigator, we are told, has found by experiment that, whereas fresh sawdust when buried in damp earth rots away in a few years, sawdust which has been soaked for some time in water, and has been thereby deprived of soluble matters, will remain in the ground under similar circumstances wholly unchanged and only slightly tinged on the exterior with earthy matters dissolved from the soil.

Compound Railway Sleepers.

Mr. C. Renson, of the Netherlands State Railways, has devised a means of using up old wooden sleepers. Sleepers generally fall where the rail rests, leaving a sound length of about 3 feet in the center. Two such pieces are joined end to end by a piece of channel iron. The rail rests on the channel iron, which thus prevents it from wearing into the sleeper. As these compound sleepers have four end faces they offer more resistance to lateral motion than ordinary sleepers.

It is a noteworthy fact that in the last 25 years not a single passenger car has been smashed in accident on the Wyoming division of the Lehigh Valley Railroad. The branch is 75 miles long. Mr. A. Mitchell, division superintendent, has every reason to be proud of the record which he has established.

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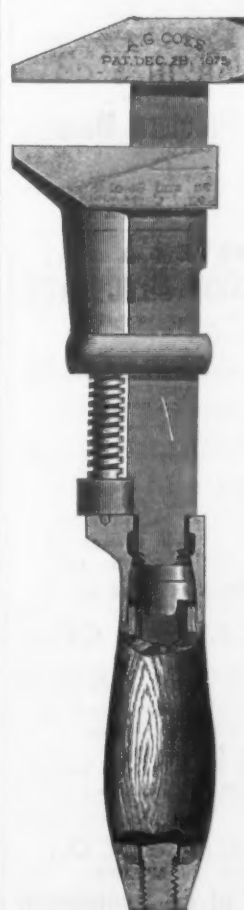
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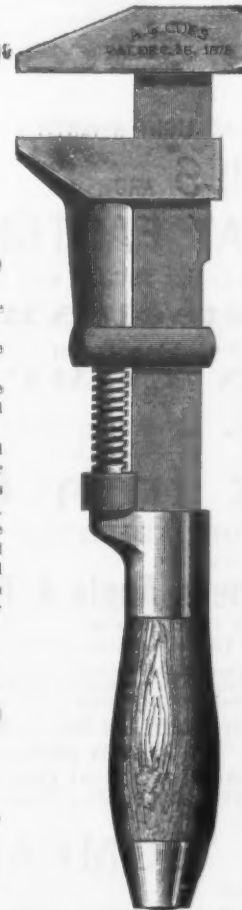
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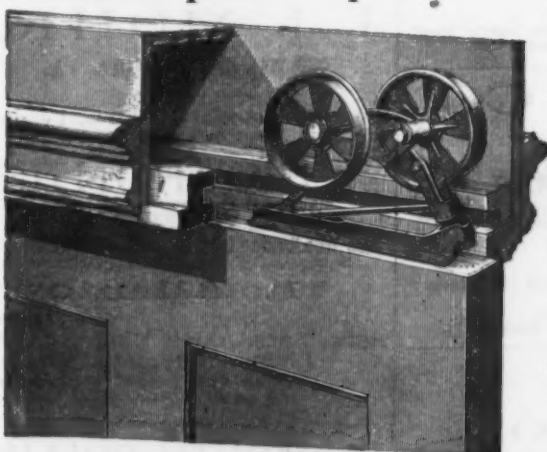
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is just the thing to prevent the feet from slipping. Its
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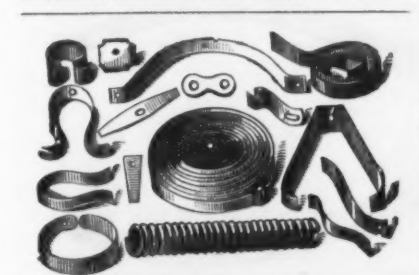
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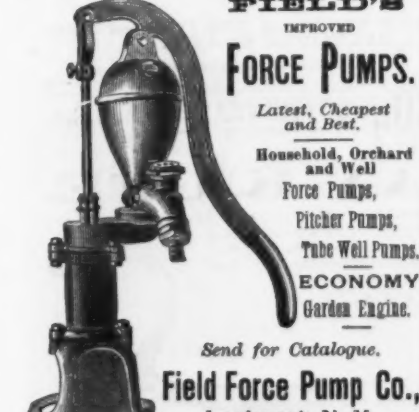
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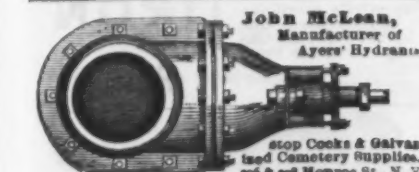
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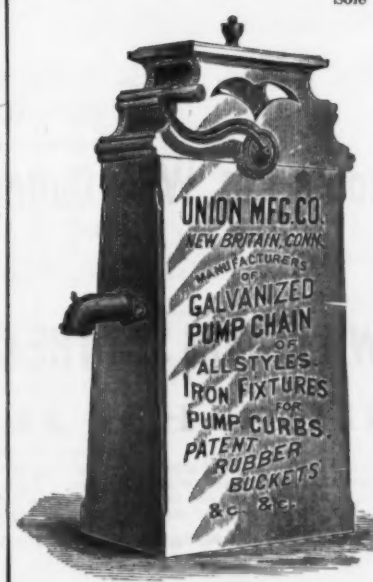
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English Letter.

(From Our Regular Correspondent.)

LONDON, December 20, 1886.

THE CHRISTMAS VACATION

will now be with us in the course of the next few days, consequently the utmost pressure exists on all sides to clear out the work actually in hand prior to Friday evening. It is gratifying to learn that in the majority of cases there is the work for the men to do. In several recent years there has been every disposition to perform the work, but the requisite orders have not been on hand, and the employers were not willing to allow their stocks to be unduly increased. This year the state of things is so much better that high pressure is being indulged in on all sides. At Sheffield, for instance, this is the traditional "bull" week, the meaning of which term I have so frequently explained to your readers. The "bull" will be "got down" by Friday evening or afternoon, by dint of the men working 18 or 20 hours a day (all piecework, or at proportionately higher rates if on day—locally "datal"—wages) or therabouts. The "bull" weeks of several years past at Sheffield have been somewhat slow and melancholy affairs, consequently the current activity is all the more welcome. Much of the work, I may say, at the cutlery manufacturers is on account of orders from the United States, although several other markets have furnished their quota to augment the aggregate demand.

In the iron trade the prevailing tone is almost everywhere favorable and hopeful. Business for this year is virtually at an end, consequently there is not a great deal doing in the open markets, but producers are everywhere in good heart, and anticipate an active demand early in 1887. It is expected, among other things, that the statistics will show that the reserve stocks of pig iron have decreased by some 400,000 to 500,000 tons during the past six months, while at the same time there has been a considerable augmentation of the shipping and consumptive demand. Should these expectations be realized the market will be correspondingly "comforted" and strengthened. The worst feature of the situation in some respects is the threatening condition of political relations between Germany and France and Austria and Russia. To-day's news seems to indicate that there may be an outbreak of war at any moment, in which case a great many things would happen. If this war should take place England would probably benefit, as she did in 1870-73 from the Franco-Prussian war, yet nobody, I am sure, in this country desires to reap advantages in that way. Old hands say there will be no war at present, on the grounds that these much-talked-of and long-expected wars rarely if ever break out, the really serious wars coming unexpectedly, like "bolts out of the blue." Some of the first fruits of the uneasiness of labor are being reaped. On the West Coast the blast furnaces at the three smelting concerns mentioned elsewhere have been out on strike for an advance of 15 per cent. in their rates of wages. Eight furnaces were stopped, at considerable expense of course, and the dispute has been settled after some days' duration by a compromise, under which the wages are to be regulated by the price of pig iron. The men were compelled to submit, owing to a resolution of the employers at the other works in the locality to lockout the whole of their men if the strikers did not promptly give way. In the result all the operatives get a slight contingent rise in their pay.

THE IRON MARKET

has continued firm, and has maintained the upward movement it legitimately developed a few weeks ago. Shipments during the week have been considerably better from Glasgow than they have been for nearly a month; inquiries have been more numerous for the American market, and the number of furnaces in blast is also comparatively low. The market closed at 43/9 1/2 per ton. In Cleveland a more quiet but satisfactory tone has prevailed; sellers have for the most part been able to obtain their quotations, and buyers have been compelled to offer better terms. For prompt delivery of No. 3 G. M. B., from 33/9 to 34/ has been realized. The long-anticipated claim for an advance of wages has at length been put forward by the blast furnaces, and having been refused by the makers there is a likelihood of difficulties arising. On the West Coast a strike has taken place at the respective works of Cammell & Co., Limited, Workington, the Moss Bay Company, Limited, and the West Cumberland Iron and Steel Company, Limited, the blast furnace workers demanding an additional 15 per cent. This necessarily caused the furnaces to be damped down. In Staffordshire there is a disposition to take advantage of the improvement to light some more furnaces, but this ill-advised proceeding has not yet been adopted. In that district a better business is being done, and the prospect is good; but there has been no advance to justify additional production. Of galvanized iron a fair number of lots have changed hands, and the same is true of sheets, plain and for galvanizing, but at this period of the year transactions are naturally few. Rates have, however, been maintained, and makers, being well booked forward, are enabled to look ahead with more confidence than they were able to do at the corresponding period a year ago. The finished iron departments remain firm but quiet. In scrap and old rails the contrary has been the case. Something akin to excitement has ruled, particularly for old double-headed rails, which have been scarce at 60/ @ 62/6, f.o.b., usual British ports. Old flange rails have also been in great request at 60/; No. 1 wrought heavy scrap, 45/; iron boiler-tubes, 37/6 @ 40/; and cast iron 36/ @ 37/6. Freight for pig iron by ordinary steamer from Glasgow to New York have regained their late firmness, being now quoted at 7/6 1/2 ton. Steel continues in good request, and makers are on the whole well off for work. Nothing new of import has been given out during the last few days, nor is much likely to be for the next two or three weeks. Large inquiries from

the States for blooms still continue, and 75/ has been paid for 7 x 7 inch sorts. Steel rails are quiet for the present, but makers are fairly well agreed that for the first quarter of the next year an enhanced price will rule, and in consequence buyers are experiencing difficulty in obtaining forward quotations.

SCOTCH PIG IRON

has been excited and stronger on the whole during the week, the higher prices having been brought about by better shipments, a renewed demand from the United States and large operations in warrants, which stand at 43/6 @ 43/9, against 42/3 a year ago. There are now 840,280 tons in Connal's stores, as compared with 661,342 this date in 1885, last week's addition being 200 tons only. Shipments to date are 51,000 tons less than last year's, while the importations of Middlesboro' pig iron into Scotland are 40,072 tons in arrears. The present severe weather will check this traffic, as the canals are frozen. Current prices are:

Deliverable alongside,	No. 1.	No. 3.
Gartsherrie, at Glasgow.....	49/6	44/6
Coltness, ".....	53/	45/
Langloan, ".....	49/6	44/6
Bummerlee, ".....	52/6	44/6
Calder, ".....	49/6	43/6
Carnbroe, ".....	46/	42/6
Clyde, ".....	46/6	42/
Monkland, ".....	45/	41/
Govan, at Broomfield, ".....	45/	41/
Shotts, at Leith, ".....	47/6	45/6
Carron at Grangemouth.....	46/6	43/6
Glenarnock, at Ardrossan.....	46/	42/6
Eglinton, ".....	41/6	40/
Dalmellington, ".....	46/	41/

MIDDLESBORO' PIG IRON

is steadily firm, the local demand being well upheld, while there is more iron going on shipments. The current quotations for G. M. B., pigs f.o.b., at makers' wharves in the Tees are:

No. 1 Foundry.....	36/	Mottled.....	31/6
" 2 ".....	35/	White.....	31/
" 3 ".....	33/6	Refined metal.....	45/6
" 4 ".....	32/9	Kentledge.....	34/6

HEMATITE PIGS

have been primed, owing to the strike as well as the well maintained demand. In West Cumberland and North Lancashire there are 30 furnaces at work, the same number as a year ago. Stocks in stores only are 125,538 tons, an increase of 26,371 tons this year. Pig iron shipments are 29,853 tons ahead, and rail shipments 81,792 tons ahead to date this year. Mixed lots are 45/ @ 46/ and makers' brands:

	No. 1.	No. 2.	No. 3.
Cleator.....	47/6	46/	46/
Lonsdale.....	46/	45/6	45/
Workington.....	46/	45/6	45/
Lowther.....	46/	45/6	45/
Distington.....	46/	45/6	45/
Solway.....	46/	45/6	45/
Maryport.....	46/	45/6	45/
Harrington.....	46/6	46/	45/6

TIN PLATES.

In London a better feeling pervaded this market, the stoppage of so many mills having had a considerable influence on buyers, and considering the time of year there has been a very fair booking of orders during the past week or 10 days. According to information received the generality of the works are fairly well booked, and on the whole the market is in a decidedly better position than it was at the opening of the month. I quote ordinary IC cokes, 13/3 @ 13/6 f.o.b., Liverpool. At Liverpool the long-expected improvement of a permanent character is very slow in coming, and the price of the general run of ordinary kinds of coke tins has become almost stationary at 13/ IC. Quotations are now 13/3 @ 13/6 IC as a rule, but there are plates to be had at 13/ IC. The demand for these Bessemer steel cokes and coke tins has been pretty good throughout the week, and the only difficulty has been to obtain advanced prices at the same rate as is expected by makers. Siemens steel plates with coke finish are in good request, and some business has been done at 13/9 @ 14/ IC. There is perhaps not quite so much inquiry for tines, the higher prices quoted having checked business a little. So far there is no change in last week's figures. In charcoal tins business is not very brisk nor is the course of the market at all favorable to an advance in prices. Coke tin wasters as well as Bessemer steel coke wasters are in brisk demand, and 12/3 @ 12/9 are figures that are freely obtained for the various sorts that are to be had.

THE HARDWARE TRADES.

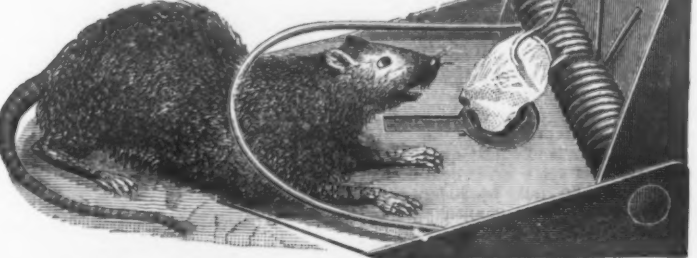
In London there is little to remark upon the course of trade, the near approach of the end of the year inducing many to withhold further orders until stock-taking is done. The general tone of business, however, is exceedingly hopeful, and the coming year promises to open briskly. In many branches the celebration of the Queen's jubilee is making itself felt, and judging from the numerous schemes afloat the total volume of trade in this direction alone will do much toward putting manufacturers on their mettle, and will undoubtedly contribute to a greater degree of activity. At Birmingham new orders on home account are becoming scarce, but as the home demand contracts there are signs of expansion in the export department which will not be fully realized, however, until the year is well turned. Australia, India and Burmah are among the most promising markets just now, though the orders arriving are to some extent held back by merchants for the new quarter. Manufacturers in most of the staple branches continue steadily employed, though there is very little of the pressure customary at this season. The demand for ornamental brass and copper kettles for home use continues to grow from year to year, but in this as in other branches production seems to be fast outrunning public requirements, and the rage for cheap goods is leading to a general deterioration of quality. A few leading firms are still doing a good trade in high-class kettles, urns, jardinières, coal-vases, lamp-bodies, &c., but the season's demand is now nearly over, and for one hand-wrought kettle that is ordered there are a hundred stamped or machine made, which may be purchased now at about the price paid for common iron kettles a few years ago. At Sheffield as Christmas draws near the general tone of conversation among workmen touches on the question of "bulling" or working overtime, to make up for the

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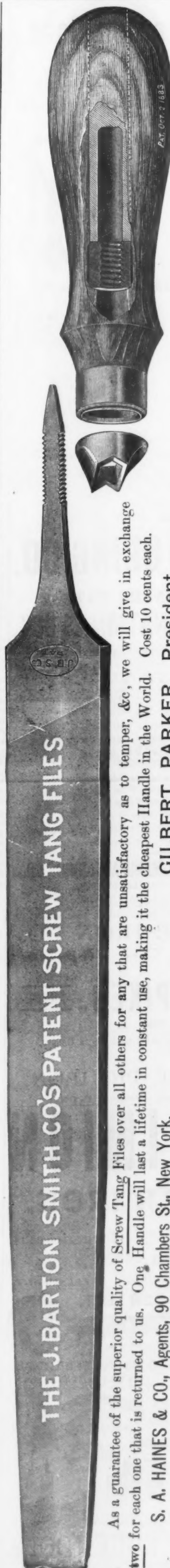
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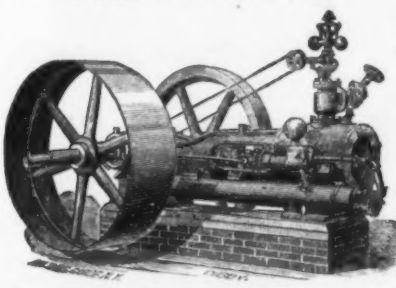
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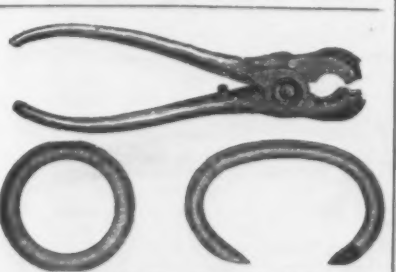
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OUR SPECIALTY:

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QUALITY CONSIDERED. ANYBODY WHO DRIVES OR BUYS A NAIL IS INTER-
ESTED, AND SHOULD WRITE FOR SAMPLES AND PRICE.


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For Beading, Reeding or Fluting, and for all kinds of light
Routing, this tool is invaluable to wood-workers.
Seven superior steel cutters go with each tool. Both ends are
sharpened, thus embracing six ordinary sizes of Beads, four sets
of Reeds, two Fluters, and a double Router Iron (3/4 and 1/2 inch).
The cutter is firmly clamped to the stock. A gauge with long,
straight bearing surfaces is used in ordinary work, and a gauge
with oval bearing surfaces is used for curved or irregular forms
of work.
No. 66. Iron Stock, with seven Steel Cutters.....\$1.00

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FOR CLEANING BOILER TUBES.



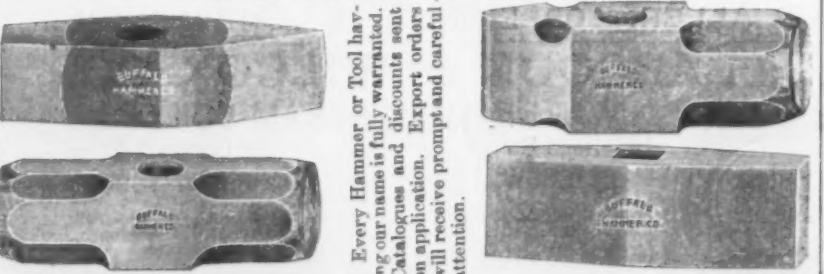
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Manufacturers of a full line of

Solid Cast Steel Hammers, Sledges, Mauls,**R. R. TRACK TOOLS, &c.**

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attention.

HARD WOOD LOCK JAW HANDLES

FOR FILES,

Rasps, Screw Drivers, &c. Locks rigidly: unlocks
readily for continued use; coppered locks. Do not
rust or break. Receives all shaped Tags without
splitting handle.

Patent applied for, 1886.

Foreign Markets.**FRANCE.**

PARIS, December 23, 1886.—**Metals.**—The pro-
ximity of the holidays has caused a lull in the Metal
trade, accompanied by a decline in Copper and
Tin. Lead and Spelter remaining sustained.
We quote at the close: 100 kg. Copper, 101 @ 103.75; Ingots and
Slabs, 107.50; Best Selected, 111.50, and Pure Co-
rocoro Ore, 105. Tin—Banco, 274; Billiton, 273;
Straits, 267.50; Australian, 267.50 @ 270 and English,
267.50; Lead, 32.25 @ 33.50, and Spelter, 38.50 @
39.25. Iron.—Our St. Dizier correspondent re-
ports as follows: Although this is usually the
dullest season we cannot complain of a lack of or-
ders, the latter continuing to pour in freely,
amounting in the aggregate to as much as there
are being filled at present. These orders are, it
is true, not equally distributed, but all makers are
more or less busy enough to be able to bridge
over the time intervening between now and
the month of February, when our spring
season usually sets in. The quotation for Coke
Merchant is 13 francs; Mixed, 14; Machine, No. 20,
15; Wire Rods, 17.50 @ 18; Wire Nails, No. 15,
21.50 @ 22; Polished Chains, Nos. 22-24, 40 @ 43
francs. At Valenciennes some of the purchases for
Paris account have been made, but it is difficult to
get at the details; they are probably connected
with the exhibition buildings. Coal.—Although the
demand for Domestic Coal in this city has
been less pressing during the week, prices remain
firm.—*Moniteur des Interêts Matériaux*

BELGIUM.

BRUSSELS, December 23, 1886.—**Iron.**—The pro-
longation of the Belgian Finished-Iron syndicate
has not influenced our market; it has merely
caused some parties who stood in need of a sup-
ply not to hesitate any longer, but to buy. Their
hesitation arose from a suspicion that the syn-
dicate would be broken up on the 1st inst. Our
export to India has not yet been resumed in full,
owing to the want of agreement with English ex-
porters of Belgian iron, this difficulty not yet hav-
ing been straightened out. Pig iron has been
stiffening. Forge Pig commanding 3.50 francs @
100 kg. for Luxembourg, and 3.90 @ 4.90 Charleroi.
Consumers have not got it all their own way any
more, and have, as to terms, now to submit to the
dictates of producers in this line. Foundry Pig is
firmly sustained at 3.20 Luxembourg, and 3.50
Charleroi. As for Finished Iron the quotations
are now as follows: Merchant, 10 @ 10.50; Beams,
10.50; Corners, 11.50; Sheets No. 2 for export, 12;
for home use, 12.50; No. 3, 14.50; Commercial,
15.50; Thin, 18.50, and No. 4, 20.50. Fifty
three Locomotives for branch railways were ad-
judicated upon to-day. On the whole, the outlook
is promising, the more so as iron is still low in
Belgium, and there is thus every inducement to
let this country have a fair share in furnishing
what countries abroad may have to order in Eu-
rope, especially the East. Coal continues looking
up.—*Moniteur Industriel*

GERMANY.

HAMBURG, December 23, 1886.—**Iron.**—Not only
in Rhinish Westphalia, but in the Sarre and Mos-
elle region and Upper Silesia the tendency has
been a gradually hardening one. There is an
eagerness to buy for forward delivery, and many
projects are on foot, partially realized in some
quarters, to form syndicates—this time not un-
der the name of the Rhine-Westphalian, but in
Rhinish Westphalia, and selling months ahead at
41 @ 42 marks @ ton. The export demand for
Spiegel has been on the increase, the tendency is
upward. White Pig has improved a couple of
marks. Foundry Pig is looking up; Thomas and
Bessemer are firmer, German Bessemer bringing
45 @ 47. Pig Iron production in Germany shows a
decrease during 10 months of 348,611 tons. Fin-
ished Iron is doing remarkably well, being in con-
tinued brisk demand, and again a couple of marks
@ ton higher. All Wire products have been raised
in price in Upper Silesia by all makers unani-
mously, and notice has been given to the trade.
Forge Pig has improved in that part of Prussia to
45, and Foundry Pig to 46 marks @ ton. There is
a good export demand for Russia, the demand for
Finished iron being brisker than ever; prices and
discounts have been placed on a more remunerative
footing. The Luxembourg syndicate has sold
its entire output for the first quarter of the
coming year. *Metals*—Are steady. There is a
good demand for Lead, and Copper is very firm.—
Boersenhalles

HOLLAND.

ROTTERDAM, December 19, 1886.—**Tin.**—After
a day or two of weakness, the market is firmer
once more at 60.75 Billiton spot and January;
March wanted and paid 61 @ 61.25; Banca quiet at
61 @ 61.25 guilders @ 50 kg.—*Koch & Vletterboom*.

SPAIN.

BILBAO, December 19, 1886.—**Iron Ore.**—The
weather being stormy all the Ore shipped
during the week has been in a wet condition. The
heavy rains have even interfered with mining
operations, but there is a good stock at the mines.
A great many steamers, diverted from the Baltic,
have flocked into our port, several large ones to
load Ore for the United States, with which
country our relations are extending. There has
transpired comparatively little on the spot, but
all the more in forward deliveries for the coming
year. We quote Campbel, 6 1/4, and Good Hubbs
5 1/2 @ 6 1/2. The sea being unusually rough, but
few steamers were able to leave. This has re-
stricted the dealings in Pig Iron, for which, how-
ever, there is a good export demand especially for
Italy. Mine owners have been trying to form a
syndicate, and Messrs. C. de Murrieta & Co., Lon-
don, have made certain proposals to them in con-
nection therewith, in order to facilitate matters,
but so far nothing has come of it, and the entire
project may be dropped. Export of Ore to date,
2,940,597 tons, against 3,149,870 tons in 1885; of Pig
Iron, 47,104 tons; coastwise shipments, 38,870;
total, 85,974.—*Bilbao Maritime y Comercial*.

AUSTRIA.

VIENNA, December 19, 1886.—**Iron.**—In spite of
the fact that we are in the depth of winter, there
is a good consumptive demand for Iron, and its
manufacturers, partially in anticipation of re-
quirements, both dealers and consumers being
in higher prices as the spring season draws near.
The manufacture of hardware and agricultural
tools in Styria is to be favored by the extension of
railroads in that part of the country, facilitating
the cheap conveyance of Iron Ore, Pig and Fin-
ished Iron and Steel, &c. Styrian exportation of
scythes to Russia has been curtailed on the one
hand by the high duties there, and on the other by
the want of protection from which Austrian
brands suffer in that country. There is a brisk
demand for hollow-ware, plain and enameled.
The Iron market closes firm. We quote Pig in
florins @ ton: 40 @ 49; Merchant, 98 @ 122.50;
Sheets, 140 @ 175, and Beams, 105 @ 110. *Metals*.
—Our market has been dull and weak; we quote
at the close: Copper, 54.50 @ 58 florins @ 100 kg.;
Lead, 17.50; Spelter, 18.80; Tin, 180 @ 181; Anti-
mony, 36.50, and Quicksilver, 226.50.—*Austrian
Trade Journal*.

EAST INDIES.

SINGAPORE, November 22, 1886.—**Tin.**—Sin e our
last circular advancing freights and exchange have
tended to depress prices all round. Tin was last
sold at \$24.75, but buyers do not now offer over
\$24.50. There is a large stock, but holders cannot

bring themselves to face the heavy loss which the
advance in exchange represents. This month's
shipments may be curtailed by want of tonnage,
but the average for November and December will
probably be full. *Tin.*—Rates to London by
steamer have advanced 12 1/2 @ ton. For New
York the T. J. Carleton occupies the berth at
unchanged rates; for Boston the S. D. Carleton
loads on charterer's account. Exchange has ad-
vanced to 3/5 1/4 for six months' right credits on
London. Shipments from the Straits settle-
ments to the United States during the first 10
months, 59,121 tons, against 53,863 in 1885; 55,279
in 1884; 99,164 in 1883; 96,772 in 1882, and 75,282 in
1881.—*Gilfillan, Wood & Co.*

PENANG, November 16, 1886.—**Tin.**—Our market
opened at \$35.25, but subsequently gave way to
\$34.47 1/2, finally closing, after some fluctuations, at
\$34.58. Receipts for the fortnight reached 10,000
piculs, of which Europeans took 8000 and Chinese
2000. Total export to England to date 135,120
piculs. Exchange four months' bank bills on
London 3/4 1/4.—*Schmidt, Kustermann & Co.*

COLOMBO, CEYLON, November 25, 1886.—**Plum-
bago.**—Has been steady at ensuing quotations in
rupees @ ton: Large Lumps, 125 @ 135; Ordinary
do., 125 @ 140; Chips, 75 @ 90 and Dust, 40 @ 60.
Since the 1st ult. there have been shipped 14,502
cwt. to England, 103 to Antwerp, and 35,296 to
the United States, making a total of 49,901 cwt.,
against 26,874 same time last year; 31,822 in 1884,
and 31,701 in 1883. Exchange, 1/6 1/4.—*Folkart
Brothers*.

CHILE.

VALPARAISO, October 29, 1886.—**Copper.**—The
decline in exchange has led to the sale of 14,670
quintals at \$10.62 1/2, equal to £10. 2/7 in England.
Nitrates.—Although it had been ascertained that
one of the makers had turned out more Nitrates
than he was allowed to do as member of the syn-
dicate, this intelligence has failed to depress our
market, producers preferring to consign to Eu-
rope rather than submit to the prices offered
them. Later on better cable advices came drop-
ping in, causing the market to become more active,
and rally to \$2.80, 95 1/2, at which figure 324,590
quintals changed hands, December delivery, equal
to 8 1/4 @ cwt. in England. Charters for Europe
first half of month, 33,400 tons. Coal—Is steady.
English at 31 @ 32 1/2; Australian at 20 1/2. Exchange
90 days' 24 1/4.—*Weber & Co.*

AUSTRALIA.

SYDNEY, N. S. W., December 9, 1886.—**Iron.**—
There has been more doing; Galvanized Iron is
very firm at £17. Fence Wire is also in better
position, but the demand not active enough to
lead to an improvement.—*Per cable via London*.

The Phosphoric Ores of Brunswick and Hanover.

The rapid growth of the basic process on
the Continent of Europe has been largely due
to the existence of two ore districts, that of
Luxemburg and that of Brunswick and
Hanover. The product of the latter is con-
sidered the ideal pig for the process, and
has given rise to a great industry where
formerly the deposits upon which it is based
were considered practically worthless. Thus
far the Ilseeder Huette district has been most
prominent, since the works owning it have
been exceptionally prosperous during the
worst of the recent depression. Some in-
teresting details concerning it are given in
Stahl und Eisen, by Fr. Kollmann, of Bruns-
wick. According to the annual report of
the Ilseeder Huette for 1885, the quantity of
stock required to produce a ton of iron were
2795 tons, the consumption of coke being 0.9
tons, and the cost of production per metric
ton 24.95 marks, or a fraction more than \$6,
and this low cost was attained in spite of
the fact that a considerable proportion of
the ore had to be hauled over 50 miles, and
much of it had to be put through a washer.
The make of two furnaces was 105,000 gross
tons. The ores available are such that a
self-fluxing mixture can be made and no
limestone need be used, the yield in the fur-
nace being 36 per cent. The result has been
that the company have been able to pay
dividends as high as 40 per cent, and that
even during the last two years it distrib-
uted 18 and 14 per cent., besides placing
heavy amounts to the credit of reserve
accounts and sinking fund. Last year this
amounted to 578,000 marks, and similar
sums were set aside in previous years. The
whole output is now used in the large basic
works belonging to the company located at
Peine.

East of this ore district there is a second
field, of which less is known, but which is
now getting into shape. A part of the ore
which is now being developed in this the
Schandelah and Grofs Vahlberg district
needs washing, and contracts for large
works have been placed. After being
washed they yield 46 per cent. The ore lies
in an almost horizontal bed, and needs only
3 to 5 feet of stripping, the first opening
being made only about 1700 feet from a
depot. Calcareous ores, developed for a
distance of about 24,000 feet, are to be
mined also. They are low in iron, but con-
tain as much as 7 per cent. of manganese.
Further deposits have been located along
the Aase hills for a distance of about 50,000
feet, the bed showing a thickness of 16 feet
at the point where it is being opened. All
the ore is obtained by stripping, and the
cost on cars at depot foot up to 2 marks, or
about 50 cents, per ton. The ores may be
so mixed that the iron carries 3 per cent.
of phosphorus, or a lower percentage, with 2
to 3 per cent. of manganese. It seems the
intention to push their sale as a mixture for
the minette ores of the Luxemburg dis-
trict with the Westphalian furnaces, to sup-
plement the lower phosphorus and manga-
nese contents of the minette ores.

It seems certain that the ores of the dis-
tricts named and of the Luxemburg dis-
trict, with the fair coals of Westphalia and
the cheap German labor, will make the
German basic-steel industry a still more
formidable rival of the makers of the
past.

In some of the great sawmill estab-
lishments of the West 6-foot circular saws are
run 760 revolutions to the minute. Running
at 750 revolutions to the minute the teeth
of the 6-foot saw are travelling nearly 3
miles a minute. Six-foot saws have been
driven at as high rate of speed as 800 revo-
lutions to the minute. In Michigan, a few
years ago, a Canadian company geared up
its mill to run its 6-foot saw 850 revolutions
to the minute. A sawmill at Paducah, Ky.,
which had a 76 inch saw and steam feed,
cut one day 10,571 feet of 1 inch poplar
boards in about 70 minutes. In this trial
the saw made no sawdust; each tooth tore
our a strip of wood about 1/4 inch long.
Michigan sawyers have boasted of a mill
dropping 16 1/2 inch 16 foot boards a minute,
but this seems like an exaggeration.



NEW REVERSIBLE GUARD RAZOR,
MADE BY THE J. R. TORREY RAZOR CO., Worcester, Mass.
his Razor is used in the ordinary manner, with or without the guard. When used with the guard it is impossible to cut the face in shaving.
It is the only Practical Safety Razor made.
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A Field & Son's Tacks, Brads, Nails, &c.
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Shears, Scissors AND Sheep Shears.

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LIST PRICE.

6 \$12.00 6 1/2 \$13.00 7 \$14.00 7 1/2 \$15.00 8 \$16.00 8 1/2 \$17.00 9 \$18.00 10 inches \$25.00 per dozen.

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No. 3 PATENT PIPE WRENCH.

The serrated jaws of the Wrench are interchangeable; that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another can be furnished adapted to either jaw without express designation. The slides, nuts and various parts are also interchangeable, thus easily repairing the Wrench at very small expense, and with as perfect practicability for further use as when the Wrench was new.
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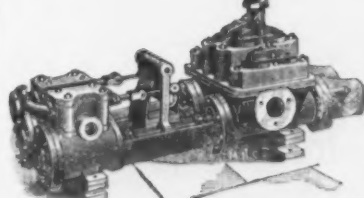
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Low in Price and Durable.



In making comparison with other Pumps it should be remembered that the Duplex Pump, being in fact, two double-acting steam pumps working side by side, has double the capacity per minute of any single cylinder steam pump of the same diameter of plunger, and that a single cylinder pump must have a plunger or water piston twice the area of one of the plungers of the Duplex Pumps in order to equal it in capacity.
These pumps are substantially constructed, having all working parts made extra strong and of lasting material. All parts, being interchangeable, can be easily removed and duplicated in case of accidental breakage or unusual wear. Low in price. Send for Catalogue.

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30 Cortlandt Street,
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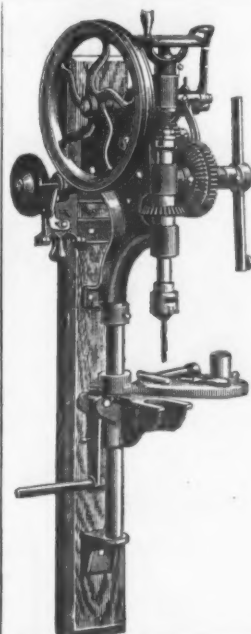
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GEO. BURNHAM & CO., Worcester, Mass.,
BLACKSMITHS' UPRIGHT SELF-FEEDING DRILLS
Patented March 30, 1883, Oct. 23, 1883 and June 16, 1885.
Superior design. Improved Workmanship. Latest Improvements.
Send for Illustrated Price List.

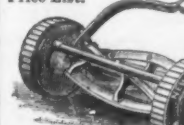
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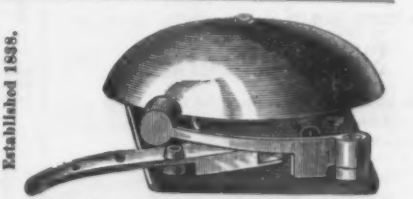
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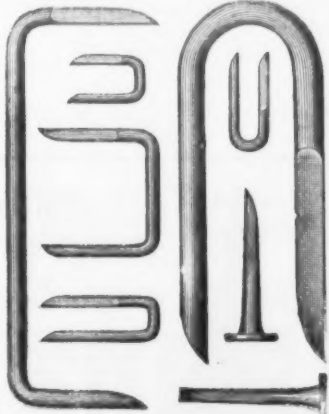


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Annual Review of the Metal Market for 1886.

We continue our review of the Metal Market, begun in last week's issue with Copper.

Tin.

London inaugurated the year weak at £92. 17/6 and New York at 20 3/4¢, with a visible supply on this side of some 4000 tons, sufficient to last us till the middle of April, and a heavy pressure to sell in Penang and Singapore, where mine owners were anxious to clear out their holdings at the ruling high dollar price before the Chinese New Year. Tin continued offering freely from London, but found no takers; while the market there fluctuated at the rate of £2, we barely maintained the opening quotation during the month. Imports of Tin into the United States during the first 11 months of 1885 had been 21,183,377 lb, against 23,318,139 in 1884; re-export, 59,888, against 57,442. One of the London metal papers remarked, under date of January 30: "Naturally some operators have been shy to operate or to support the market in face of the falling off in deliveries. They came to the very reasonable conclusion that its cause was the present price, and it has in all probability had something to do with it, though in the main the falling off is to be attributed, as we have shown on previous occasions, to the recent combination among Tin-Plate makers to keep down the production, but still the comparatively high prices of Tin doubtless formed one of the principal inducements among Tin-Plate makers to effect that combination." Shipments from the Straits Settlements to the United States during the first 11 months of 1885 have been 37,058 piculs, against 55,279 in 1884, 106,231 in 1883, 104,395 in 1882, 76,522 in 1881 and 137,615 in 1880. In February, although consumption on this side continued slack, there arose more speculative inquiry, preventing the price from receding, while London advanced to £93. 5/6. The price here remained steady at 20 3/4¢. During March our market relapsed into an excessively quiet mood, but was sustained by the firmness with which the metal was upheld in London, where the fluctuations were light. While our quotation advanced during the month to 20 3/4¢, London closed unaltered at £93. 5/6. The Banca sale in Holland averaged 56.25 guilders, as compared with 55.50 guilders 1/2 50 kg. the previous sale. The net import into the United States during the first seven months of fiscal year had been 16,889,535 lb, against 15,438,999 in 1885.

While in April the statistical position of Tin had been gradually getting into better shape on both sides of the Atlantic, in consequence of a falling off in shipments from the Straits and Australia, the labor troubles in this country kept consumption among us at a low ebb, at the same time discouraging the buying of futures for a rise, in view of the uncertain aspect of the spring trade. The visible supply in London and Holland had been 13,519 tons on February 1, 13,633 on March 1 and 13,163 on April 1. The previous year it was 16,211 tons on April 1, and in 1884 14,991. Despite this improved position of the metal the manipulators in London seemed to get tired of their holdings, crowding them on our market, and under this pressure we should in all likelihood have broken down but for the gradual cessation of the strikes reviving the consumptive demand among us. May thus opened slightly higher at 20 3/4¢, London also advancing to £94. 7/6, and consumers on this side taking courage and recommencing to operate with the return of the labor market to a normal condition, business in Tin, both for actual requirement and in futures, began to display greater activity, carrying the price here to 21 1/4¢ on the spot, and to £98. 7/6 in London. Import into the United States during the first eight months of fiscal year, 18,542,527 lb, against 16,908,246 in 1885. The visible supply in Europe and America on May 1 was 12,186 tons, against 13,654 in 1885. Arrivals in New York had diminished notably during the month. Although June usually is a month not remarkable for its activity, because it stands midway between the spring trade and the dull midsummer season, it made an exception this time, being enlivened by the consumptive demand, checked while the partial disorganization of traffic and labor lasted, Tin also being benefited by the favorable change in the general status. Added to this came the news from the East that China and India had intercepted more Tin than in former years, and that, with no increase in the output apparent, it was becoming comparatively scarce, that consequently shipments thence would remain light for several months in succession. The effect of the improved demand here and the intelligence alluded to was to advance the price here to 22 3/4¢, and in London to £101. 10/ toward the close of the month. Net import into the United States during the first 10 months of fiscal year 10,967 tons, against 8981 the previous one; export from the Straits Settlements to the United States during the first fiscal quarter 18,078 piculs, against 8406.

July opened with a visible supply in Europe and America of 12,002 tons, against 13,613 in 1885. Although news from Australia comprised all that had been stated with reference to lessened production, and the statistical position, as shown above, was sound, the advance during June had evidently been too rapid and considerable, and in spite of a tolerably good consumptive demand—considering the time of the year—a reaction set in. Opening on July 1 at £101 in London, it closed the month at £96. 15/6, while in New York the decline was from 22 3/4¢ to 21 3/4¢. Fluctuations had meanwhile been violent, in London especially, where speculative dealings were at their height. The Straits Settlements had shipped this way during the first four months 21,861 piculs, against 12,689 in 1885. On August 1 the visible supply in Europe and America stood 12,072 tons, against 14,795 in 1885, and 14,208 in 1884. During the month the consumptive demand on this side again continued quite heavy, but was unable to prevent a further slight decline early in the month; the

metal was, however, better sustained than in London, where speculators for a fall, the strong statistics notwithstanding, had it pretty much all their own way the first week, when Tin receded to £95. 5/6, while we dropped to 21 3/4¢. Soon, however, both markets rallied, London winding up the month at £99. 2/6, and New York at 21 3/4¢. The net import of Tin into the United States during the last fiscal year, ended June 30, had been 12,417 tons, against 10,667 the previous year. The shipments from the Straits Settlements to the United States during the first six months had been 31,533 piculs, against 16,051 in 1885. The decreased supply from the East was shown at the time to have been as under:

Twelve months ending August 31.			
From	1884.	1885.	1886.
Tons	Tons	Tons	Tons
Straits to London.....	12,598	14,058	12,284
Australia to London.....	8,815	8,091	6,627
Straits to America.....	4,453	2,550	5,351
Australia to America.....	450	650	1,075
Total.....	26,296	25,384	24,337

The visible supply in Europe and America on September 1 was found to be 11,667 tons, against 14,389—in other words, statistics were about as favorable as they possibly could be, added to which there set in in September a strong diversion in the East, the rise in silver stimulating larger exports to China and India. Business in general, moreover, became more active during the month. Speculation for a rise was encouraged thereby, and while the consumptive demand continued satisfactory, there were many elements to favor a vigorous upward turn, which took place during the course of the month, London opening at £99. 2/6 and closing at £102. 10/6, while in this market the opening price was 21 3/4¢, and at the close 22 3/4¢. Net import into the United States during the first seven months 15,862,380 lb, against 10,906,075 in 1885. Shipments from the Straits Settlements during the first seven months this way 40,766 piculs, against 16,471 same time in 1885.

October was a month of extreme fluctuations in London and a very unsettled state of affairs in our own market, which the London manipulators had for the time being selected for their battleground, and during the fight our consumers were at times able to secure a supply on favorable terms, consumption continuing steady among us during the month. Opening at £102. 10/6, London closed the month at £100. 7/6, while here we opened at 22 3/4¢ in order to wind up at 22 3/4¢. Import of Tin into the United States during the first eight months, 18,765,386 lb, against 14,444,752 in 1885; re-export, 142,846, against 57,663. Export from the Straits Settlements this way during the first eight months, 52,817 piculs, against 20,252. In November the London speculators repeated their operations in this market, resulting in the same erratic fluctuations, which at one time advanced the price some £2, in order to close the month at £100. 15/6, while New York improved from 22 1/4¢ to 22 3/4¢, at which the month terminated without developing any new features during its course. Import of Tin into the United States during the first nine months, 21,172,732 lb, against 16,785,818 in 1885; re-export, 142,923, against 57,963. During December the rather early winter and a partial reaction in Europe and America against all speculation for a rise, coupled with the stoppage of work by Tin-Plate mills on a large scale in Wales, caused a state of apathy in the Tin market, which was later on intensified by the news that the Straits would be heavy shippers to the end of January, in consequence of the approaching Chinese new year holidays. The visible supply in Europe and America on December 1 stood 11,879 tons, against 13,100 in 1885. Opening at £100. 15/6, London closed the month at £100. 5/6, while New York gave way from 22 3/4¢ at the opening to 22 1/4¢ at the close. Shipments of Tin from the Straits Settlements to the United States during the first nine months, 55,338 piculs, against 23,443 in 1885 and 46,225 in 1884. Import of Tin into the United States during the first 10 months, 23,830,455 lb, against 19,761,081 in 1885.

Price of Straits Tin at New York.

Jan. '86.	17 1/4¢ @ 17 1/4¢	Jan. '86.	20 1/4¢ @ 20 1/4¢
Feb. '86.	17 1/4¢ @ 17 1/4¢	Feb. '86.	20 1/4¢ @ 20 1/4¢
Mar. '86.	17 1/4¢ @ 17 1/4¢	Mar. '86.	20 1/4¢ @ 20 1/4¢
Apr. '86.	17 1/4¢ @ 18 1/4¢	Apr. '86.	20 1/4¢ @ 20 1/4¢
May '86.	18 1/4¢ @ 19 1/4¢	May '86.	20 1/4¢ @ 20 1/4¢
June '86.	19 1/4¢ @ 21 1/4¢	June '86.	21 1/4¢ @ 21 1/4¢
July '86.	21 1/4¢ @ 22 1/4¢	July '86.	21 1/4¢ @ 21 1/4¢
Aug. '86.	21 1/4¢ @ 21 1/4¢	Aug. '86.	21 1/4¢ @ 21 1/4¢
Sept. '86.	20 1/4¢ @ 21 1/4¢	Sept. '86.	21 1/4¢ @ 21 1/4¢
Oct. '86.	20 1/4¢ @ 20 1/4¢	Oct. '86.	21 1/4¢ @ 21 1/4¢
Nov. '86.	20 1/4¢ @ 20 1/4¢	Nov. '86.	21 1/4¢ @ 21 1/4¢
Dec. '86.	20 1/4¢ @ 20 1/4¢	Dec. '86.	21 1/4¢ @ 21 1/4¢

Lead.

January opened at \$4.65. Common Domestic, but was but moderately active, and exhibited little strength, closing at \$4.55, while in the West it remained well sustained, and in London Soft Spanish advanced from £12. 5/ to £12. 10/, an improvement which was lost again during the month. Spanish Pig Lead export during the first nine months of 1885 had been 88,352 tons, against 85,029 in 1884. Intelligence reached us that in London a company has been formed with a capital of £100,000 to work Lead mines in British Burmah, extending over an area of 2560 acres, situate at Tennasserim, about 80 miles distant from Moulmein, one of the rice ports of the colony. The company's name is the British Burmah Lead Company. Consumers being sufficiently stocked and their trade as yet slack, while the scarcity of Lead caused a hardening tendency, the dealings remained restricted in February, our market meanwhile slowly advancing from \$4.55 to \$4.65 at the close. In London Soft Spanish recovered to £12. 10/. There were exported from Spain during the first 10 months of 1885 97,981 tons of Pig Lead, against 95,939 during the corresponding period of the previous year. While in March the local demand increased somewhat, whereas the scarcity of Domestic Lead continued, and it remained steady at 4 1/2¢, some importation from Europe was resorted to, the sales during the month reaching 3000 tons, half of which foreign statistics of Domestic production for 1885 showed a falling off of about 10,000 short tons compared with 1884, when the output was 140,000 short tons, while in 1883 the product had been 144,000 tons in the aggregate. In the Lon-

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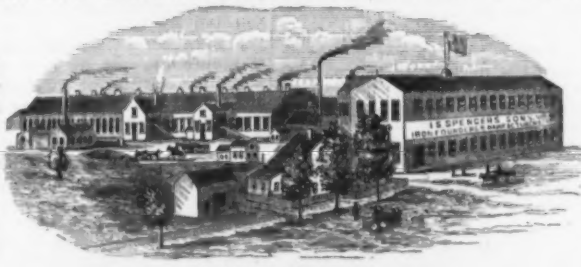
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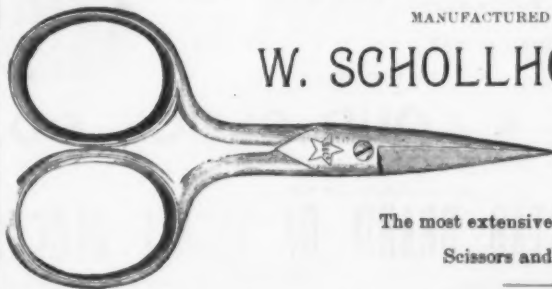
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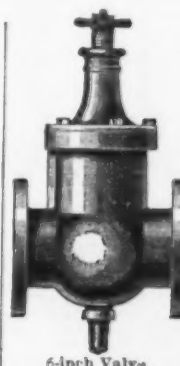
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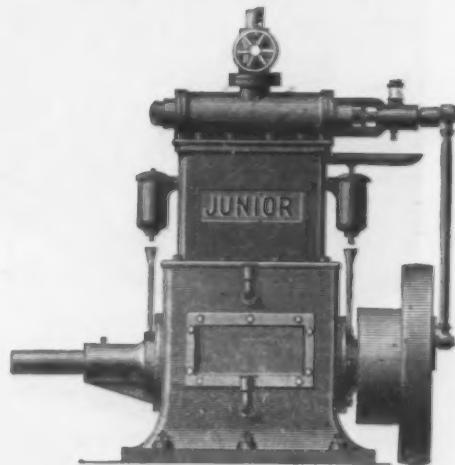
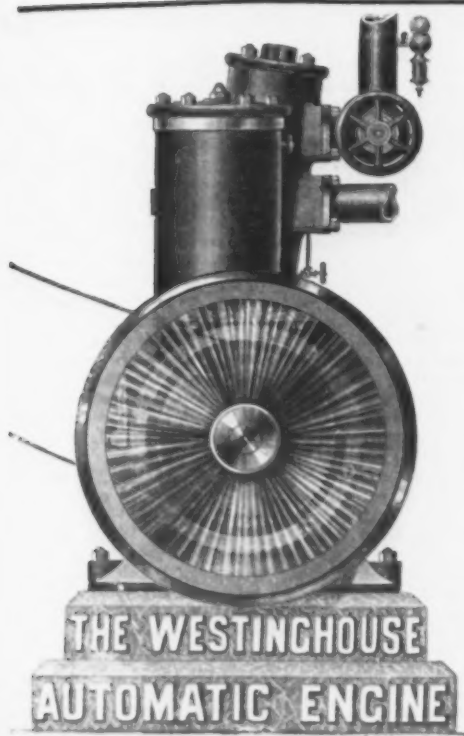
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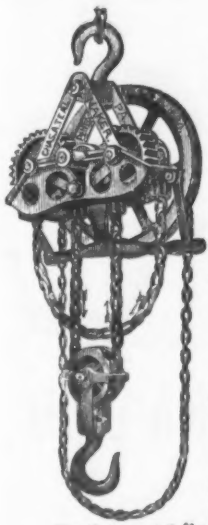
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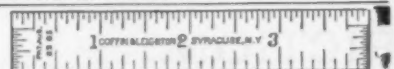
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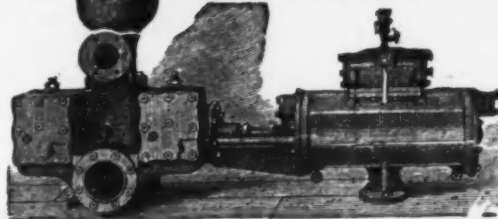
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Special Machinery for Grain Elevators, Grain Steam Shovels, &c., contracted for. Car Wheels
and Car Castings at lowest rates.

604 Pullman Building, Chicago.

don market Soft Spanish had meanwhile
advanced to £13. 5/. Spanish exportation
of Pig Lead was shown to have been 108,004
tons in 1885, against 108,227 in 1884 and
116,109 in 1883.

As at ruling prices in Europe Lead could
not be laid down there at less than 4 3/4¢,
and as the demand was but little curtailed
by the strikes, high wages paid in the build-
ing trades preventing serious interruption
in the branch at the time, Lead seemed in
good position early in April. In spite of
this quite a decline was engineered during
its course by the chief operator, the market
winding up at 4 3/4¢. London meanwhile
advanced to £13. 7/6. The January export
of Pig Lead from Spain amounted to 9485
tons, against 10,365 in 1885. At the West
the strikes had curtailed production to a
notable extent in April. In May work was
gradually resumed at Western centers of
production, while on this coast it was found
that many building contracts had been can-
celled, while the labor troubles still existed
to some extent. The consumptive demand
at the same time being light, and London
simultaneously dropping £1, there were
thus elements enough calculated to depress
the market without the necessity of exer-
cising extra pressure on it, which the main
operator, nevertheless, thought fit to do,
causing the price here to give way to 4.05.
During the first half of June the Richmond
Company was a free seller of Lead, the most
of it at \$4.65 @ \$4.70, but later on better
figures were obtainable, the local demand,
restricted in April and May, coming for-
ward for the replenishment of stocks, caus-

figure. December developed no new fea-
tures in our Lead market, which continued
tame, with sales but little over a thousand
tons, and the price gradually giving way to
\$4.30 @ \$4.35. In London Soft Spanish
declined from £12. 17/6 to £12. 15/. Dur-
ing the first nine months the export from
Spain had been 82,597 tons, against 88,302
in 1885.

Price of Common Domestic Lead at New York—

	1884.	1885.	1886.
January.....	3 3/4 @ 4 1/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
February.....	4 @ 4 1/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
March.....	4 @ 4 1/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
April.....	3 3/4 @ 4 1/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
May.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
June.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
July.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
August.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
September.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
October.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
November.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4
December.....	3 3/4 @ 3 3/4	3 3/4 @ 3 3/4	4 1/4 @ 4 1/4

SPELTER.

Opening at 4 3/4¢ @ 4 3/4¢ and closing at
the same figure, January proved an exces-
sively dull month in the Spelter trade in New
York, Silesian at the same time being worth
5¢ nominally, the latter commanded £14.
17/6 @ £15 in the London market. Feb-
ruary in point of activity did not vary much
from the preceding month, the range for
Common Domestic being 4 3/4¢ @ 4 3/4¢, Sile-
sian remaining 5¢, while advancing in Lon-
don from £15 to £15. 2/6. In March there
was a slight increase of activity and
strength, the price recovering to 4 3/4¢ @
4 3/4¢, Silesian being steady at 5¢ in this
city, and declining in London to £14. 12/.

Spelter production in Europe and the United States in tons of 2240 pounds.

	1885.	1884.	1883.	1882.	1881.	1880.
Rhenish Prussia and Belgium	129,754	129,240	123,891	119,103	110,989	98,830
Silesia.....	79,023	76,119	70,405	68,811	66,497	64,459
England.....	23,099	29,259	28,661	25,581	24,419	22,000*
France and Spain.....	14,847	15,344	14,671	18,075	18,358*	25,000
Poland.....	5,019	4,164	3,733	4,400	4,000*	4,000*
Austria.....	2,928*	2,365	2,867	3,199	2,520*	2,520*
United States.....	255,270	256,485	244,228	239,295	226,783	206,809
Total.....	34,000	34,415	32,743	33,769	36,000*	23,239
Total.....	289,270	290,600	276,971	273,024	256,783	230,048

ing an advance to 47/8, with sales during
the month aggregating some 3000 tons. In
London Soft Spanish declined meanwhile to
£13. 5/ after having recovered to £13. 10/.
During the first two months Spain had ex-
ported 27,042 tons of Pig Lead, against
31,175 in 1885.

A fair amount of trade developed in July,
consumption being fully up to the current
output, and of Domestic alone 5000 tons
changed hands in the New York market at
between \$4.87 1/2 @ \$4.90, the market clos-
ing at \$4.85, at which foreign could be im-
ported. London opened at £13. 5/ and
closed at £13. Pig Lead exportation from
Spain was during the first four months,
37,578 tons, against 42,138 in 1885. In
August, after the activity of the preceding
month, a lull set in which the chief operator
availed himself of in order to keep out
foreign by offers of Lead at 4 3/4¢, the Lon-
don market being at the same time adversely
influenced by the pressure which operators
for a fall contrived to bear upon it. At one
time London had dropped all the way to
£12. 12/6, but subsequently under a scarcity
of Spanish recovered to £13, our own mar-
ket closing the month at 4 3/4¢. During the
first five months the export of Pig Lead
from Spain did not exceed 46,368 tons,
against 51,235 tons the previous year.
August proved one of the dulllest in the
Lead trade that had been seen for years.
Nor was September destined to display an
increase of activity, there being in the first
place the plumbers' strike to interfere with
business, and in the second place the dis-
organized state of the White Lead com-
bination, manufacturers having been con-
voked to assemble at Chicago and set
matters right, but failing to do so to the
satisfaction of all interested. The fact is
that their business had suffered materially
throughout the spring and summer. The
normal consumption of White Lead being
60,000 tons per annum in this country, grave
disappointments in this branch were well
calculated to affect the market for Crod-
ing Lead. Opening at 4 3/4¢, our market
closed at 4 3/4¢. London meanwhile declined
from £13 to £12. 17/6 with Soft Spanish.
Export of Pig Lead from Spain during the
first six months, 54,780 tons, against 61,317
in 1885. Statistics of German Lead pro-
duction in 1885 reached us at the time, the
same comparing with the previous year as
follows:

	1885.	1884.
Tons.	22,481	22,394
Silesia.....	15,946	15,923
Rhenish-Saarsau.....	5,595	6,177
A. Poesgen & Sons.....	3,910	3,300
Remy, Hoffman & Co.....	4,608	5,541
E. B. Goldschmidt.....	3,971	2,731
Walter Cronck.....	5,248	5,401
Tarnow Works.....	12,804	11,351
Rothenbach.....	56	36
Clau-thal.....	12,059	10,479
Freiberg.....	4,072	5,469
Total.....	91,810	94,110

The drawbacks and impediments which
have prevented the Lead demand from re-
vival in September continued unabated in
October, and the result was a listless state
of affairs, restricting the aggregate dealings
to something like 2000 tons, the price open-
ing at \$4.40 declining to \$4.05 @ \$4.25 to-
ward the close of the month. Soft Spanish
stood £12. 17/6 in London at the beginning
of the month, and £12. 15/ at its close.
German Lead exportation amounted during
the first eight months to 272,033 metrical
cwt. of 100 kg., against same time last year
260,707, and the import to 11,598, against
8995; excess of export, 927 tons. Spanish
Pig Lead export during the first seven
months was 62,565 tons, against 71,138 same
time in 1885. November was inaugurated
with a somewhat better feeling, and under
a brisker demand the price recovered to
4 3/4¢, but subsequently the market again
became unsettled, closing at 4 3/4¢. Spain
exported during the first eight month-
75,106 tons of Pig Lead, against 79,441 in
1885. Soft Spanish opened in London at
£12. 17/6, and closed the month at the same

Meanwhile, a strong syndicate had been
formed in Europe restricting the output to
what it had been in 1885; Polish and Hun-
garian producers joined the same in March.

A moderate business was transacted at
4 3/4¢ @ 4 3/4¢ in April, London quoting Sile-
sian at £14. 5/ @ £14. 7/6, while in New
York the latter did not vary from 5¢.
Although in April and May the demand for
Spelter for building purposes had been slack,
the metal evinced more strength during the
latter month at 4 3/4¢ @ 4 3/4¢, Silesian on the
other hand giving way to \$4.80, having de-
clined in London to £13. 17/6. In June the
syndicate in Europe decreed a further re-
duction of output of 5% to date from July 1,
which did not prevent London from further
declining to £13. 1/6, while in this city Sile-
sian was still nominally held at 4 3/4¢. Com-
mon Domestic selling moderately at 4 3/4¢ @
4 3/4¢.

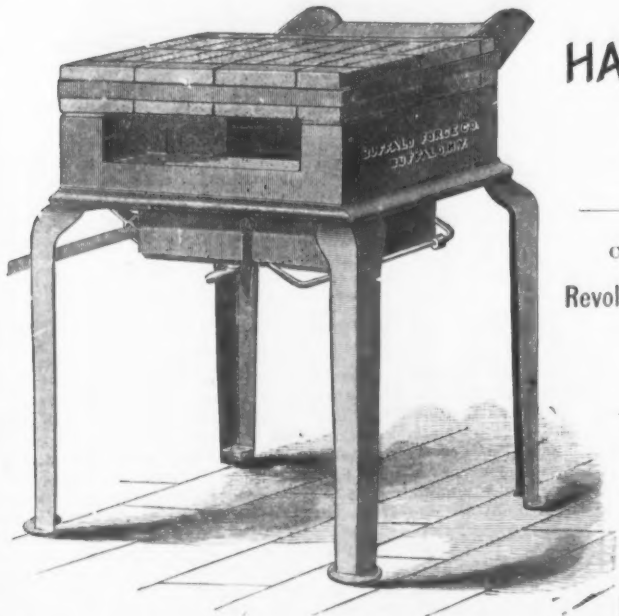
During July the latter remained dull and
featureless at 4 3/4¢ @ 4 3/4¢. London re-
covered to £14. 2/6, Silesian, the latter being
worth in New York 4 3/4¢ @ 5¢. The lack of
activity was intensified in August when the
price ruled 4 3/4¢. Silesian again dropping in
London to £13. 15/, and here to 4 3/4¢. In
September news reached us from Breslau,
Prussian Silesia, that an extraordinary de-
mand that set in for spelter in slabs and
Sheet Zinc, the works being busy night and
day to the extent of their capacity to meet
the same. In New York the market became
stagnant in the meantime, closing at 4 3/4¢
@ 4 3/4¢, Silesian not bringing over 4 3/4¢,
while in London it receded to £13. 12/6.

Although the demand here remained im-
significant during the month of October, it
gained slightly in strength, the European
markets having taken an upward turn. The
quotations ranged between 4 3/4¢ and 4 3/4¢,
and Silesian advanced to 4 3/4¢ in London to
£14. 2/6. In November our market gained
slightly, both in activity and strength,
under a speculative inquiry, and no more
Common Domestic was obtainable under
4 3/4¢. London advancing simultaneously to
£14. 5/6, and Silesian remaining firmly held
in our market at 4 3/4¢. The long expected
upward turn in the American market at
length took place during the last month of
the year under the impulse of greater activ-
ity in the galvanizing branch, Common im-
proving in New York to \$4.65, and Silesian
to \$4.90. London advanced to £14. 7/6.

Lowest and Highest Price of Common Spelter—

	1883.	1884.	1885.	1886.
Jan.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
Feb.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
March.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
April.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
May.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
June.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4
July.....	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4	4 1/4 @ 4 1/4</

BUFFALO HEATING FORGES



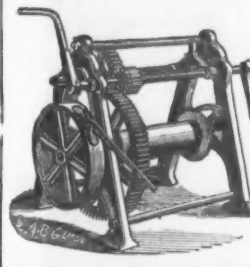
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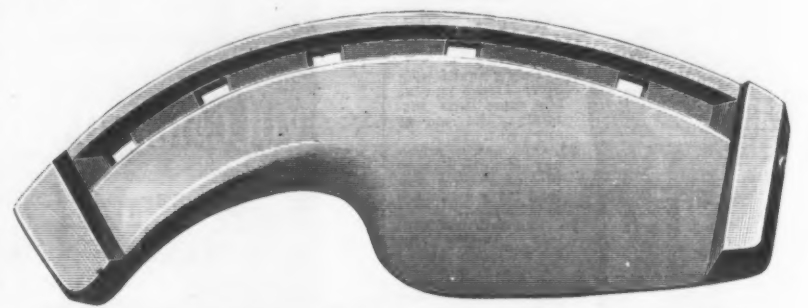
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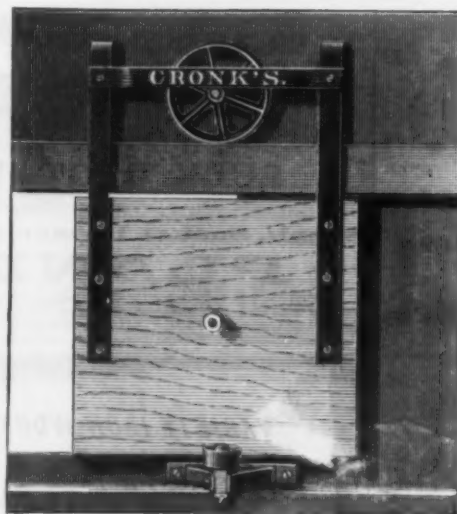


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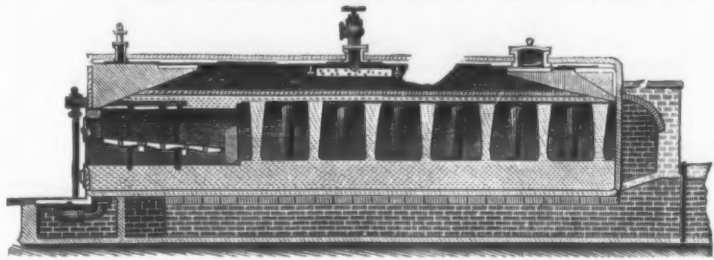
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cents a pair. Price to dealers, \$3.00 per
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above \$4.35 @ \$4.45. Import into the United States during the fiscal year ended June 30, 254,956 tons, against 226,198 in 1885. While in September Liverpool was improving in consequence of higher Steel and Tin, the New York market failed to rise above \$4.25 @ \$4.35, Coke Tin.

Liverpool improved 3d. 7 box in October, some 25 mills having closed in Wales, and the market here displayed greater animation, without, however, bringing an advance, Coke closing at \$4.27 1/2 @ \$4.35. Import of Tin Plates into the United States during the first eight months, 426,570,129 lb, against 363,852,698 in 1885; re export, 1,642,263, against 553,459. In November the demand fell off somewhat, but Coke Tin, being scarcer for the moment, improved to \$4.50 @ \$4.62 1/2. December brought the news that some 30 odd mills had shut down in Wales, owing partially to labor troubles and in part because the brands of some had become unsaleable in consequence of poor quality, causing good Plates to advance 6d. 7 box. The production of bad quality had been indulged in by some makers in the eagerness to compete with Steel Plates, which for some time past had been superceding Iron ones. Coke Tin closed in this market at \$4.30 @ \$4.60.

Distribution of Tin Plates from Wales in 1885.

United States.	Boxes.
Canada.	3,776,577
Mediterranean and Black Sea.	309,465
Holland, Germany and Belgium.	255,312
Norway, Sweden and Baltic.	222,782
China and British India.	125,445
France and Switzerland.	98,972
Australasia.	100,560
Spain and Portugal.	137,918
South and Central America.	98,572
West Indies.	88,663
Cape, Ceylon and Mauritius.	12,568
North Africa.	5,790
Sundry other countries.	3,404
Total.	5,290,536
Home consumption.	1,850,000
Total consumption.	7,080,536

New Process of Working Old Steel Rails or Miscellaneous Steel Scrap.

Mr. E. D. Wassell, of Pittsburgh, has sent us the following report of experiments made with a new process for reworking old steel rails into bars from 7 to 8 inches in width, and also for a new method of working high carbon steel into a low carbon steel, and by the same process to make a perfect and homogeneous weld with steel at any point in carbon. In other words, Mr. Wassell claims that steel bars of any carbon can by his process be piled the same as puddle bars and worked into finished products as expeditiously as the puddle bars, and with better results as to finished surfaces. Mr. Wassell reports:

Experiments have been made at different times and in different places which have proved satisfactory to all the parties interested. Further tests have been made within the last two weeks at the Atlantic Iron Works at Sharon, Pa., and, although made under the most adverse circumstances, yet the results obtained were entirely satisfactory. These experiments were conducted in one of the puddling furnaces which was located about 100 feet from the rolls. The piles of steel when taken from the furnace were conveyed to the rolls in a wheelbarrow, which presumably was the first time a wheelbarrow was ever used for that purpose. There are no reflections intended by these remarks, as the arrangements of the Atlantic Iron Works are complete, and will compare with any other works in their line of manufacture. But the method of conducting the experiments was such that the appliances of the works could not be used, as they were not adapted to any new departure of this kind. The process consists first in reducing the old steel rail to a flat bar about 7 1/2 inches in width. This is done by the use of rolls which are peculiar in their form, being designed so as to force the metal in the head and flange of the rail in a direction transverse to the length of the bar, so that instead of going into the length of the bar it is thrown into the width, and both the head and flange of the rail is by the action of these rolls brought to a level plane with the web or neck of the rail. The method of rolling an old steel rail heretofore has been to flatten it down to a 4-inch bar. This, on account of there being so much more metal in the head and flange than in the web or neck, causes the latter to wire draw to such an extent as to make the bar worthless. After the rails are flattened down to 7 or 7 1/2-inch bars they are cut into suitable lengths, and piled in the same manner as puddle bars for nail plate or other forms of finished products. The piles made from the steel bars are then charged into a suitable furnace containing a sufficient depth of molten slag to entirely cover the piles so charged, so as to prevent oxidation of the steel taking place. The steel thus protected from oxidation may be heated to almost any temperature without any injurious effects being produced. To get satisfactory results in the shortest possible time it is necessary that the slag bath be brought up to the highest possible degree of heat before charging the furnace, as the steel, independent of the carbon it may contain, is capable of undergoing as high a temperature as that under which it may have been made either by the Bessemer process or in the open hearth furnace. Under these circumstances the carbon will be eliminated much sooner. If the conditions under which this process of working old steel rails or steel scrap are right, the time required to reduce a high carbon steel to a low carbon should not be over 40 minutes, and it may be done in 35. Then the charge may be drawn from the furnace and rolled down into nail plate or other finished products with the best results in the matter of making perfectly sound and homogeneous nail plate, sheet steel, heavy plate or anything into which they may be rolled. This method of reworking or treating old steel rails or other steel scrap is in wide contrast to the ordinary method of simply heating the steel rail in the ordinary sand bottom furnace, in which the steel cannot be heated to a higher temperature than a bright cherry red, for if they are the steel is rendered worthless for all purposes except for open hearth use. Steel can be treated by the use of the slag

with little waste, as it is impossible to oxidize it if properly covered by the slag, and when rolled down into finished products will carry a better surface for the same reason. The practical tests that have been made at different times have shown that the plates made under the process of treating the steel in a slag bath have been pronounced by practical experts to have a very well finished surface. The following results in reducing the carbon are reported as the outcome of practical tests made under the supervision of Mr. Wassell. Steel bars containing 0.65 in carbon by analysis (made by Messrs. Hunt & Clapp, of Pittsburgh) were piled and subjected to the action of the slag bath. The piles were charged into the slag bath cold and were allowed to remain in the furnace 22 minutes, when they were taken out and rolled into scalp steel 6 x No. 10 gauge. A second analysis was made by the same chemists, and the carbon was found to have been reduced to 0.53 per cent. from 0.65. Another test was made with steel bars, containing 0.62, and the carbon reduced to 0.47 per cent. Old steel rails containing 0.45 in carbon were subjected to the slag bath for 35 minutes, and by analysis it was shown that the carbon had been reduced 0.25. Steel thus treated has been rolled into nail plate, the nails cut from which have been pronounced high in quality. Sheet steel of No. 26 gauge has been rolled from the bars made under this process which have not shown the least indication of an imperfect weld.

In the matter of output it can be handled as readily as the steel slab, and reduced by rolling in the same number of passes as are required to reduce a Bessemer steel slab to nail plate. It is claimed that the method of heating will be less laborious for the heater, as the piles do not require to be turned over in the furnace. Less skill will be required in heating, as the charge will be governed by time and not by the judgment of the heater. It will be a matter of adaptation to the change in the method of heating. When once formed it will be more easily done than in the ordinary way, and the output as great if not greater than by working the Bessemer steel slab. The value of the process will be apparent when it is known that Bessemer steel slabs are worth in the market about \$33.50 per gross ton, and old steel rails are worth about \$22.50 per ton, showing a difference in cost of what may be termed the "crude material" of \$11, and that to put old steel rails into nail plate will not cost over \$2.50 per ton more than to put Bessemer steel slabs into nail plate. The same will apply to any other finished products which may be made under this process, thus showing an advantage of about \$8.50 per ton over Bessemer slabs. The process is open for examination as to its merits or correctness both in theory and practice. It is the intention of the parties interested in the patents to dispose of a certain number of rights to a certain number of mills for certain lines of manufacture, not to be less than six nor more than eight mills for the manufacture of nails, reserving certain rights in the patents for their own benefit.

Mr. Wassell's claims and statements are interesting so far as they go, but iron-masters will require much more specific data before they will reach the conviction that one of the most interesting problems now before metallurgists is solved—viz., that of utilizing old steel rails by rolling them into other forms.

The Cost of a Box Car.—The following statement is published of the itemized cost of building one first-class box car:

Material and Labor in Body of Car.		
Articles.	Rate.	Amount.
3,987 feet lumber.....	2 cents per foot.	\$79.74
704 pounds wrought iron.....	5 cents per pound.	35.20
606 pounds cast iron.....	3 cents per pound.	18.18
100 pounds nails.....	4 cents per pound.	4.00
6 pounds plat washers.....	6 cents per pound.	.36
10 pounds lag screws.....	7 cents per pound.	.70
1/2 gross 1 1/2-inch screws.....	30 cents per gross.	.15
46 pounds steel springs.....	9 cents per pound.	4.14
160 sheets of tin.....	7 cents per sheet.	11.20
8 pounds solder.....	15 cents per pound.	1.20
2 pounds tin nails.....	10 cents per pound.	.20
25 pounds mineral paint.....	1 cent per pound.	.25
4 gallons linseed oil.....	75 cents per gallon.	3.00
30 days carpenter's labor.....	\$2.25 per day.	45.00
2 days tinner's labor.....	2.00 per day.	4.00
1 1/2 days painter's labor.....	2.00 per day.	3.00
Total in body.....		\$210.38

Material and Labor in Pair Trucks of Car.		
Articles.	Rate.	Amount.
487 feet lumber.....	2 cents per foot.	\$9.74
1,000 pounds wrought iron.....	5 cents per pound.	50.00
1,306 pounds cast iron.....	3 cents per pound.	39.18
184 pounds steel springs.....	9 cents per pound.	16.56
64 pounds brasses.....	22 cents per pound.	14.08
4 pairs wheels.....	\$40 per pair.	160.00
4 pounds mineral paint.....	1 cent per pound.	.04
1/2 gallon linseed oil.....	75 cents per gallon.	.38
1/4 gallon asphaltum.....	\$1.50 per gallon.	.37
Carpenter's labor.....	\$2.25 per day.	5.63
Painter's labor.....	2.00 per day.	5.00
Total in trucks.....		\$296.48
Total in body.....		\$210.38
Total in both or one car.....		\$506.85

The United States war ship Tennessee, recently put out of commission, was built at the Brooklyn Navy Yard in 1865, and was called the Madawaska. In 1875 she was extensively repaired and renamed the Tennessee. Her engines were built by John Roach and are good for two years' more service, but her hull is beyond repair except at a greater expense than allowed by law. These engines are the first compound engines ever put in an American man-of-war. The Tennessee registers 4840 tons, carries 22 guns and a crew of 450 all told. She was last put in commission in 1879, and since then she has burned over 14,789 tons of coal, which cost \$84,157.49.

The Airedale Steel and Iron Company, Limited, near Leeds, England, is completing a new plant with three furnaces, two 10-ton converters and two 15-ton open-hearth furnaces, with 30-inch blooming and 28-inch finishing rolls.

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THE WEEK.

An important enterprise nearing completion on the Pacific Coast is the postal telegraph in course of construction between Westminster, in British Columbia, and San Francisco. From the latter point to the British Columbia boundary is about 1100 miles, and from thence connection is made with the Canadian Pacific telegraph system by crossing the Fraser River. All parts of the country from Victoria and other points on Vancouver Island, thence eastward to Winnipeg, are brought into direct communication with the Atlantic seaboard and European cable. Altogether there are included about 60,000 miles of wire. The trunk line wires of the Postal Telegraph Company, which is independent of the Western Union, are wholly of copper, weighing over 770 pounds to the mile.

Iron shippers by the Reading Railroad are informed that rates of freight for 1887 will be advanced at least 10 per cent., in consideration of the advance in pig.

Parties in New York City are anxious to obtain permission to lay water-pipes beneath the street pavements, in order to supply hydraulic power to elevators by pumping salt water from the rivers on either side.

The Italian Government has issued notices of an international competition of machinery and implements for the cultivation and treatment of hemp, which it is proposed to hold at Ferrara next August. The exhibition will comprise all kinds of machines and instruments proper to the cultivation of hemp, such as plows of various kinds, drill sowers, &c., crushing machines, brakes, stripping and peeling machines, especially those which strip and peel raw hemp and produce 2 cwt. of commercial tow in an hour with a cost of less than 6 f. per cwt.

There were built in the United States during the year just closed, according to the *Railway Age*, 8010 miles of new main line railway track. Kansas leads the country with the surprising amount of 1520 miles, the greater part laid within the last six months. Assuming the average cost throughout the country to have been but \$20,000 per mile, the expenditure for road-way alone was \$160,000,000. Present indications are that the year 1887 will show even greater activity.

The Board of Estimate and Apportionment concluded the final estimates for 1887. It will cost \$31,657,273.55 to run the Government of the City of New York for the ensuing year. This amount is \$764,276 6c less than last year. The heaviest items aside from interest payments are \$4,285,000 for the Police Department; \$3,843,000 for the Board of Education; \$2,900,000 for the penal, reformatory and charitable institutions; \$1,800,000 for the Fire Department, and \$1,050,000 for streets.

Secretary Manning has approved of the estimated value of foreign coins of the world receivable in payment of checks, as submitted by the Director of the Mint. There are no changes in the values of gold coins, but a uniform reduction is made in the value of silver coins equivalent to a decline of more than 3 cents per ounce in the price of bullion. The values declared for the ensuing year are as follows, in cents: Austria, florin, 35 $\frac{1}{2}$; Bolivia, boliviano, 72 $\frac{1}{2}$; Ecuador, sucre, 72 $\frac{1}{2}$; India, rupee, 34 $\frac{1}{2}$; Japan, yen, 78 $\frac{1}{2}$; Mexico, dollar, 70; Peru, sol, 72 $\frac{1}{2}$; Russia, rouble, 58 $\frac{1}{2}$; Tripoli, mahbub, 65 $\frac{1}{2}$; United States of Colombia, peso, 72 $\frac{1}{2}$. The monetary unit of Egypt was changed by the decree of November 14, 1885, from the "piastre" to the "pound." "The standard of Japan is given in the new circular as double instead of single silver as heretofore." Japan has nominally a gold standard, but practically silver is the money of account.

The canal boatmen in this State are making an earnest effort to obtain a reduction of elevator charges from $\frac{1}{4}$ to $\frac{1}{8}$ cent per bushel. On the part of the elevator interest it is affirmed that the charges now made are unremunerative.

At Trenton, N. J., on the 29th ult., judgment was entered against the railroad companies for the taxes of 1884 in all cases where special questions have not been raised. The railroad companies asked for further delay, but Chief Justice Beasley refused to grant the request. Before the State Board of Assessors on the 30th Senator Sewell and Major Green appeared for the Pennsylvania Railroad and objected to the assessment on interstate equipments and the valuation of sidings. The testimony will be taken on January 10.

The postal authorities at Washington are perfecting a scheme designed to improve the registered mail facilities between the United States and Cuba.

Shipments of grain to Europe from the port of Montreal during the year just closed show an increase of 40 per cent., as compared with the year 1885. The increase in shipments of wheat, which was almost entirely American, arriving via the Welland Canal and St. Lawrence routes was 64 per cent., and in corn 90 per cent. Shipments during 1886 were as follows: Total shipments of grain of all kinds, 17,000,000 bushels; of wheat, 7,000,000 bushels, and of corn, 4,500,000 bushels.

The Vienna press is becoming convinced that Russia is determined on war. Reports of increased Russian armaments are continually coming to hand from various sources. The latest intelligence of this kind is to the effect that 300,000 Russian troops have been ordered to mass in Kieff, and that the occupants of 10,000 houses have received official notification that soldiers will soon be billeted in them.

The annual review of the trade of Buffalo for 1886 shows receipts of grain aggregating 94,858,931 bushels, including flour as wheat, the largest movement on record, with the single exception of that of 1880. The arrivals of flour were 4,502,000 barrels, nearly double the best previous showing. The receipts of lumber were 259,500,000 feet, and the shipments of anthracite coal 1,478,000 tons. The latter figures have never been reached before, and the former not for years. As a consequence vessel and canal-boat property yielded handsome returns.

A scheme which has been on foot for several months culminated last week in a meeting at No. 18 Broadway, of the principal companies and firms engaged in the iron bridge building. Among those represented were: The Union Bridge Company, now building the iron bridge across the Hudson at Poughkeepsie; Edgemoor Company, of Wilmington, Del., which did the iron work of the Brooklyn Bridge; the Keystone Company, of Pittsburgh, Pa. Those present organized themselves into the American Bridge Builders' Association, and elected president and secretary. The organization represents over \$70,000,000 of capital, and will have its office in this city. Its purposes are stated to be mutual co-operation, discussion of prices, and principally recommendations regarding specifications, the latter being most important, much needless expense and trouble being caused by faulty specifications and incompetent engineering.

The Pacific Coast Association has been dissolved and now, according to Chicago advices, there is a "free-for-all fight" on Pacific Coast freight traffic from this point. On account of reductions already effected by the competition of the Canadian Pacific rates are said to be already below the cost of transportation.

The plans of three new steel ferryboats for the Rapid Transit Ferry Company, of Staten Island, have been accepted by the Board of Directors, and the contracts will be made this week. Some embarrassment may arise from the fact that the Supreme Court decides that the lease of the ferries from Whitehall street to Staten Island, granted by the city, is illegal.

One of the great mining schemes in California is a 12-mile tunnel for draining the entire group of mines in Nevada City and Grand Valley. The water power of Yuba River will be used to drive the drills and to propel the cars. The tunnel where it enters the mines will be 1200 feet below the surface. There has been subscribed \$1,000,000 toward the expenses of the work.

According to the latest advices Russia has concluded arrangements for a loan of 75,000,000 francs, to be devoted to the construction of a canal from the Gulf of Perekov across the neck of the Crimea to the Sea of Azov, thus facilitating communication between the River Don and the Black Sea.

A powerful European syndicate known as the Rothschild group of capitalists has decided against further Russian loans, which is considered in Berlin an absolute prohibition of a Russian war loan. At his New Year's Day reception President Grévy expressed his confidence in the prolongation of prevailing peaceful relations between the great powers. A hopeful view of the outlook was also uttered by Herr Tisza, the Hungarian Prime Minister.

From tables prepared by the *American Grocer* it appears that the wholesale cost of staple articles of food this year were, with one or two exceptions, lower than in 1885. Higher prices have ruled for some of the luxuries, such as coffee and canned goods, but, as the advance was made mostly during the last quarter of the year, it has not to any appreciable extent influenced the cost of living. There is no cause for grievance so far as the food supply is concerned. Sugar has declined 1 cent per pound, rice 1 to 1 $\frac{1}{2}$ cents, tea 2 to 3 cents; butter has averaged 4 $\frac{1}{2}$ to 2 $\frac{1}{2}$ cents per pound higher, cheese 1 $\frac{1}{2}$ cents higher on medium and lower grades, eggs 1 $\frac{1}{2}$ cents per dozen lower, pork \$1.50 per barrel lower, lard $\frac{1}{4}$ cent per pound lower; flour has averaged \$4.43 per barrel for straight winter wheat, being the lowest average price on record. Wheat sold at an average of 1 to 2 cents per bushel above the cost for two preceding years. Canned goods range from 10 to 20 per cent. higher for most sorts.

W. M. Gibson, Prime Minister of the Hawaiian Government, has prepared a statement of the financial condition of the kingdom, showing that the revenue for 1887 will be \$2,000,000, and the bonded debt, including the new loan of \$930,000, contracted in England, will also be \$2,000,000.

Ex-President Gowen asserts positively that the Baltimore and Ohio Railroad are fully protected in their contract with the Jersey Central and Reading Railroads for an outlet in New York City, and that, should an exigency arise, a third line will be built.

The Dock Department is charged by President Coleman, of the Department of Taxes, with extravagant expenditure. Since it was organized it has received \$12,000,000, and the result is "simply ridiculous." The new headquarters at Pier A, he says, are overrun with supernumeraries and luxuriously furnished. Mr. Coleman will not vote to give the commissioner another dollar. His statements are flatly contradicted.

Freight-car heaters have been adopted by the Pennsylvania Railroad Company to protect merchandise in transit from frost. The heater is fed by oil placed in a reservoir beneath the floor of the car. Through tubes the heated air is conveyed into the car, and by an automatic governor an even temperature can be preserved at any degree desired. The Pennsylvania Railroad have already equipped 200 freight cars with these heaters and ordered 400 more.

E. Cooper, of Santa Barbara, has proved that olive culture can be made to pay in California. He has a grove of 6000 trees which yearly yield 50,000 bottles of excellent oil, which he sells for \$1 a bottle.

A Scotch shipbuilder has submitted to the Admiralty the plans of a novel war vessel intended for the defense of the Clyde and other estuaries. The vessel is 150 feet long, 30 feet wide, and is divided into 32 watertight compartments by bulkheads; the bottom of the hull describes a segment of a circle, allowing the vessel to turn on its axis; and above the water-line she has a steel belt 2 feet thick and sloping up and down, so that a shot striking the apex of the belt would be shattered, or glance off if it struck the slope. Her armament consists of two powerful guns, one placed fore and the other aft. The funnel is made on a telescopic principle, and on a deck when in action there would be nothing on which a shot could take effect except the guns.

The city of Portland, Oregon, has a population of 40,000, having nearly doubled since 1880, and if the three cities, Portland, East Portland and Albini, were consolidated the population would be fully 50,000.

The Knights of Labor in Chicago appeal to workmen through a secret circular to boycott the "domineering autocrat," Phil Armour, the pork packer, who successfully resisted the eight-hour movement last summer.

The London *World* says the rage for monster armor-clads has spent itself, and unless naval designers suddenly agree upon a new type of ship the Admiralty will concentrate their attention upon keeping the existing warships in an efficient state, and upon developing mosquito fleets of gun and torpedo vessels, capable of high speed, of carrying powerful guns, and of making comparatively long sea passages.

Mayor Hewitt, in assuming the duties of his office, promises to give the people "the very kind of administration they have been clamoring for." The debt of the city, which a year ago was \$36,406,772 is now \$33,624,823, being a decrease for the year of \$2,781,948. The principal portion of the debt is for the Bridge, the Park and water supply. The assets of the city are shown to be about \$50,000,000.

Shipments of live stock and fresh meat from this port to foreign ports for the year just closed included 52,470 beefs, 3610 sheep, 230,980 quarters of beef and 10,653 carcasses of mutton, against 62,080 beefs, 4631 sheep, 392,709 quarters of beef and 54,283 carcasses of mutton in the year 1885. The profits are supposed to have been small and the outlook is not encouraging.

A Sheffield paper of December 18, says: "Edge tools, sheep shears, saws and files are being again freely inquired after for South Africa, with which market business has been almost at a stand since the Transvaal retrocession. The revival is more apparent in the Cape of Good Hope district. Several manufacturers are feeling the change for the better. Cutlery and plated goods continue in exceptionally brisk request."

The foreign ship arrivals at the port of New York during the year just expired numbered 5977, surpassing the total of any former year. The increase is in steamships, of which there were 2247. Among sailing craft schooners are the only class which gain, ships barely holding their own. The coastwise arrivals also show an increase compared with former years, the total being 15,541, of which 11,838 were Eastern. The Southern arrivals were 3703, showing a decrease.

The shipments of wheat from Baltimore last year were 10,531,000 bushels, against 14,575,262 in 1885, and of corn nearly 11,000,000 bushels, which is a slight increase over 1885.

John S. Newberry died on Sunday at Detroit, Mich., in his 61st year. He was a member of the firm of Newberry & McMillen, and was interested in many enterprises, having established the Michigan Car Works, and held large investments in the Detroit and Cleveland Steam Navigation Company; the Vulcan Furnace, at Newberry, in Chippewa County; the Detroit Car Wheel Company, and the Baugh Steam Forge. In 1878 he was elected to Congress, and in 1881 was prominently urged for the position as Secretary of the Interior in President Garfield's

Cabinet. He was known as one of the foremost admiralty lawyers in the country. His estate is estimated at about \$3,000,000. He leaves a widow, three sons and a daughter.

The electric motor for Third avenue is pronounced entirely practicable.

Col. Washington A. Roebling, whose genius contributed much to the erection of the Brooklyn Bridge, and who for a time suffered from the severe mental strain, is now reported to be fully restored to health.

Charleston *News and Courier* publishes an elaborate review of the agricultural and industrial development of South Carolina during the last year, of which the editor says: "In manufactures the results are magical and marvelous. The number of manufacturing establishments in the State has advanced from 1230 in 1860, to 3242 in 1886. The capital invested has increased from \$6,931,756 to \$21,327,970. The number of hands employed is 33,378 in 1886, against 6904 in 1860, and 8145 in 1870." The value of the products is \$29,951,551. The cotton mills give employment now to 4889 persons.

Maine shipbuilding steadily diminishes. Ten years ago, in 1877, the tonnage constructed in Maine amounted to 76,393 tons; last year only 56 vessels were built, with a tonnage of 15,094. Vessels are wanted now only for the fisheries and coasting trade.

Cleveland vessel owners clamor for improved facilities for unloading ore.

There are now nearly 235 miles of natural gas-pipe laid in the city of Pittsburgh, and there are six companies now supplying gas, of which one owns 180 miles. The pipe ranges in size from 3 to 30 inches.

S. S. Messenger & Sons' large agricultural works at Empire City, Northampton County, Pa., together with five new dwellings and a farmhouse, were destroyed by fire on Friday morning. Loss between \$10,000 and \$50,000; insurance \$11,000.

In some lines Detroit manufacturers are unsurpassed in magnitude by those of any other city in the Union. The *Free Press* says there is one industry alone—that of car building, in its various branches—in which the value of the annual output for Detroit is about \$8,000,000. The materials used are almost wholly of Michigan production, but the great bulk of the finished work is sold outside of the State. The product of the iron mines of Michigan and of the Michigan pine woods is utilized in this as in many other industries. Detroit was the pioneer in the development of the copper industry of Michigan, and the smelting works established there indicated a disposition to make the most of the mineral development.

The application of the New York District Railway Company for the appointment of commissioners to take testimony and determine whether their underground railway should be permitted to be built throughout the lengths of Broadway and Madison avenue was denied by the General Term of the Supreme Court, on the ground that the Tunneling act—under which the company proposed to proceed—was unconstitutional.

The Mercantile Library Association, of St. Louis, are about to erect a fire-proof building on Locust street, at a cost of \$500,000.

Latest Legal Decisions.

KEEPING OPEN SHOP OR WORKHOUSE FOR GENERAL BUSINESS ON SUNDAY.

D. was indicted under the Massachusetts statute for violating the Lord's day by keeping open his barber-shop for indiscriminate business on Sunday, and was convicted. He carried the case—Commonwealth vs. Dextra—to the Supreme Judicial Court of Massachusetts, where the judgment was affirmed. He relied upon the point that his business was one of necessity on that day. Judge Gardner, in the opinion, said: "We are not called upon to pass on the question whether it is a work of necessity to cut hair and shave beards on the Lord's day. The question does not arise in this case. We construe the statute when it declares that it shall be an offence to 'keep open a shop, warehouse or workhouse on the Lord's day,' to mean that the law prohibits the keeping open a shop, warehouse or workhouse for the purpose of doing business therein on the Lord's day, and it is immaterial what that business may be."

DOING BUSINESS ON SUNDAY.

P. was indicted for doing business on Sunday. He was a blacksmith, and had a shop near a village. The indictment alleged that his business was a disturbance and a nuisance to the good people of the County. On the trial it was shown that he did business on every Sunday, but that few persons observed that he was at work; and he showed that he belonged to a "Christian sect" who kept the seventh instead of the first day of the week as Sunday. The defendant was convicted, but moved in arrest of judgment on two grounds: 1. That he had not in fact disturbed any one in his religious or devotions. 2. That he could not be compelled to observe Sunday as a religious day, when by his own religion he was bound to observe the seventh day as his Sabbath; but the motion was overruled, and he carried the case to the Supreme Court of Tennessee, where the conviction was affirmed. The chief justice (Deaderick) in the opening deciding the case—Parkes vs. State—said: "However abandoned in principle or vicious in practice a man may be, if he keeps his wickedness to himself, and does not offend against the rules of public decency, he is out of the reach of the law; but if he makes his vices public, they then become,

by the bad example they set, of pernicious effect to society, and are punishable by the law. The statute makes it unlawful for any one of the enumerated classes to follow his ordinary secular vocation on the Sabbath day because it is immoral, and is of pernicious effect; and though it may be conceded that a single offense may make the offender liable only to the penalty prescribed by the statute, yet a succession of such acts becomes a nuisance, and is indictable. Such a succession and repetition of acts as is shown in this case is an indictable nuisance, and it is not necessary to show that any one was disturbed thereby. The contention that as defendant by his religion kept another day as his Sabbath is not an answer to the indictment. The statute requires the observance of Sunday, and it must be observed."

COLLECTION OF DRAFTS AND CHECKS.

S. drew five drafts on R. in Vermont, and deposited them with W., at Adrian, Mich., for collection. W. sent the drafts to the St. Albans Bank, in Vermont, his correspondent, for collection, and they were paid and drafts of the bank on its correspondent in New York were sent to W. in payment, but before all of them could be presented for payment the St. Albans Bank failed. S. demanded the payment of the last three drafts, having been paid the others by W., and the latter refused to pay, on the ground that he was acting through his correspondent for S.; but he, S., contended that, as W. undertook the collections and selected his agents, he was liable for their acts and defaults. S. sued and was beaten, and then carried the case—Simpson vs. Waldbly—to the Supreme Court of Michigan, where he succeeded. Judge Morse, in the opinion, said: "There is a conflict of authority on the question here, and as it has not yet been settled here we must be guided and governed in our action by what seems to us to be the most correct view in justice and in principle. It has been held in New York, Indiana, Ohio and New Jersey that the home bank must be the loser, upon the principle that that bank undertook the collection of the draft or check and selects its agent, and must be responsible for his neglect or default, as it would be for the default or neglect of its own officers or clerks in the collection of a home bill, or as a contractor would be bound to answer for any negligence or default of his sub-contractors or workmen in the performance of his contract. But in other States—Iowa, Massachusetts, Connecticut, Louisiana, Illinois, Wisconsin, Mississippi, Maryland, Missouri and Tennessee—and also by the Supreme Court of the United States, it has been adjudged that the customer depositing the draft or check for collection must be presumed to know, and to contract upon the knowledge, that in the ordinary course of business the home bank must employ correspondents abroad to collect and transmit the money and that the customer must be held to have consented to this course of business, by which the correspondent becomes his agent, and not that of the bank. We have come to the conclusion that by the employment of under agents for its convenience the home bank becomes responsible for the acts and defaults of its correspondents. It has been urged upon us that this holding will subject customers to heavy charges for collection and to great inconveniences, to the serious interference in the collection of drafts and checks on distant points. But we cannot agree with this contention. As long as banks and bankers or other persons hold themselves out to collect such drafts and checks for a compensation or any advantage they ought to be governed by the same rules of law that apply to other persons, and if they wish to avoid such responsibility it is very easy for them to accept such business only upon a specific agreement as to their duties and responsibilities."

TELEGRAPH COMPANIES—FAILURE TO TRANSMIT MESSAGE.

B. gave to a person whom he desired to send to the telegraph office a dispatch which he had written on a scrap of paper, and instructed him to transcribe it on one of the company's blanks and send it. This was done, the name of B. being signed by his messenger. The dispatch was not delivered, and B. sued to recover the statutory penalty for a failure to transmit and deliver a message. The company set up the defense that they were not liable, as B. had not signed the message, and that, as no authority had been shown in his messenger to sign it for him, it was not his dispatch. The trial court gave B. judgment. The company took the case—Western Union Telegraph Company vs. Buskirk—to the Supreme Court of Indiana, where the judgment was affirmed. Judge Mitchell, in the opinion, said: "The jury were justified in finding from the evidence that the signature of B. was duly authorized. The company's agent having received the message and the money for its transmission without objection, they are not in a position to raise any question with B. either as to the authority of the person who signed his name or concerning the manner or character in which it was signed. The message was properly directed and sufficiently indicated on its face who the sender was. Having been received for transmission without objection, the other party interested being content, it is not for the company now to question the authority of the person who signed it for B. Thousands of messages are received for transmission by telegraph companies which are communicated to them orally by the senders, which the companies' agents write out and sign by the implied authority of the sender. If they are so received they are messages to be transmitted subject to all the liability imposed by law."

A car is being constructed at the Eliza Furnace, in Pittsburgh, which is to be used in conveying metal from it to the American Iron Works, directly opposite. It is to be of iron, and will be lined in the interior with brick. Tanks into which natural gas will be introduced are to be added. These will furnish the heat which is to keep the metal warm from the time it is discharged from the cupola till it is taken over the bridge to the works.

ESTABLISHED 1823.

THE WORLD'S HEADQUARTERS FOR AND EVERYTHING FOR CHEAP SCYTHE STONES

"Leader" Red End Scythe Stones at \$1.50 per Gro., f. o. b. Factory, 60 Days, 5 Gro. Lots.

We warrant these stones to be better value than any other cheap stones offered for sale, but they are NOT

PIKE'S GENUINE "INDIAN POND" BLUE STONE—RED END,

which have stood the test for over fifty years, and are pronounced by all good judges in *all countries* to be the best *Scythe Stones* in the world. *We own or control all the Genuine Indian Pond Quarries*, also the following reliable kinds, viz.: BLACK DIAMOND, LAMOILLE, WILLOUGHBY LAKE, VERMONT and PARKHURST RAGG, VERMONT and PREMIUM QUINEBAUGH, GREEN MOUNTAIN, WHITE MOUNTAIN, GRITTY and DIAMOND PEARL, &c., &c. These good, useful brands can be found on sale by *First-Class Wholesale Dealers*.

GENUINE RAGG AND QUINEBAUGH.

We have recently secured the Genuine Parkhurst Ragg and Vermont Quinebaugh Quarries.

CELEBRATED "DODGE" CHOCOLATE.

We have also purchased the Genuine "Dodge" Chocolate Quarries at Lisbon, and now offer the Trade this Splendid, Fine, Sharp-gritted Stone *in all shapes*. It is suitable for Razors; Carpenters', Curriers' and Shoemakers' Tools; also for Fisherman Stones, as it cuts the steel so fast and gives a Scythe, Axe or any other tool a fine, keen edge quickly.

To supply everything required in our
special line from all parts of the world,

OUR PLAN!

OUR MOTTO!

GENUINE BRANDS,
STANDARD QUALITIES,
LOWEST PRICES,
FAVORABLE TERMS.

WE WISH YOU ALL A HAPPY NEW

A. F. PIKE MAN'F'G CO.,

SCYTHE STONES, OIL AND WATER STONES SHARPENING EDGE TOOLS.

GRINDSTONES CHEAP.

Best Lake Huron Grindstones at \$6.50 per Ton, f. o. b. Port Austin, Mich., 60 days.

Cheap freight can be secured to *all* points, and especially so during the time navigation is open, as the Mill and Quarries are located on Lake Huron, and we get the benefit of all-water routes and rates. Our Quarries at Port Austin produce as choice gritted stone as can be found, and we expect to furnish such stone as are suitable for all purposes required, from the smallest to the largest, and from all our different Quarries, from the Finest to the Coarsest.

WASHITA AND ARKANSAS OIL STONES.

We now own over seven hundred acres (700) of the best *Washita* and *Arkansas Quarry Lands* within six miles of Hot Springs, Ark. We guarantee our Washita and Arkansas Stone to be as *White*, as *sharp-gritted*, as *well finished*, and as *well packed as any made*. We make all shapes.

TURKEY OIL STONES.

We have just received a large consignment of the Genuine Turkey Oil Stone (Rough Rock) from *Smyrna*, which is now at the Manlius, N. Y., Factory, and we can supply regular or special sizes, as desired, at short notice.

LABRADOR OIL AND WATER STONE.

Of these we have a large stock of all sizes and shapes.

HINDOSTAN AND SANDSTONE.

At our Warehouse at Orleans, Ind., we have a full stock of selected, well-made and nicely packed Hindostan and Sandstone of different sizes.

We have recently imported a large stock of **BELGIAN** and **ITALIAN RAZOR** and **GERMAN WATER HONES**, and are now having them carefully selected and packed ready for shipment.

RAZOR HONES.

KNIFE SHARPENERS.

We have Genuine Vienna Emery Table Hones with Ebony and Maple Handles, also Labrador Kitchen Stones.

SCYTHE RIFLES. Our Old-Fashioned Emery Scythe Rifles give excellent Satisfaction.

Send us Ten cents (to pay cost) and we will send you a useful little Desk Stone and Paper Weight which all Book-keepers will find handy to sharpen Erasers, Knives, &c.

DESK STONE.

YEAR AND AWAIT YOUR FAVORS.

Pike Station, N. H., U. S. A.

PRODUCTIONS OF THE
AMERICAN ARMS COMPANY,
 BOSTON, MASS., U. S. A.

AMERICAN ARMS CO.'S
 (S. & W. Model.)
**NEW AUTOMATIC, SHELL EJECTING,
 DOUBLE ACTION REVOLVER.**



Retail Price, \$10.00.

**The Latest and Best
 IN THE MARKET.**
 Using the S. & W. Central Fire Cartridges.
 32 AND 38 CAL., C. F.

AMERICAN ARMS CO.'S
 Ring Shell Extracting, 38 Cal.,

Revolver.

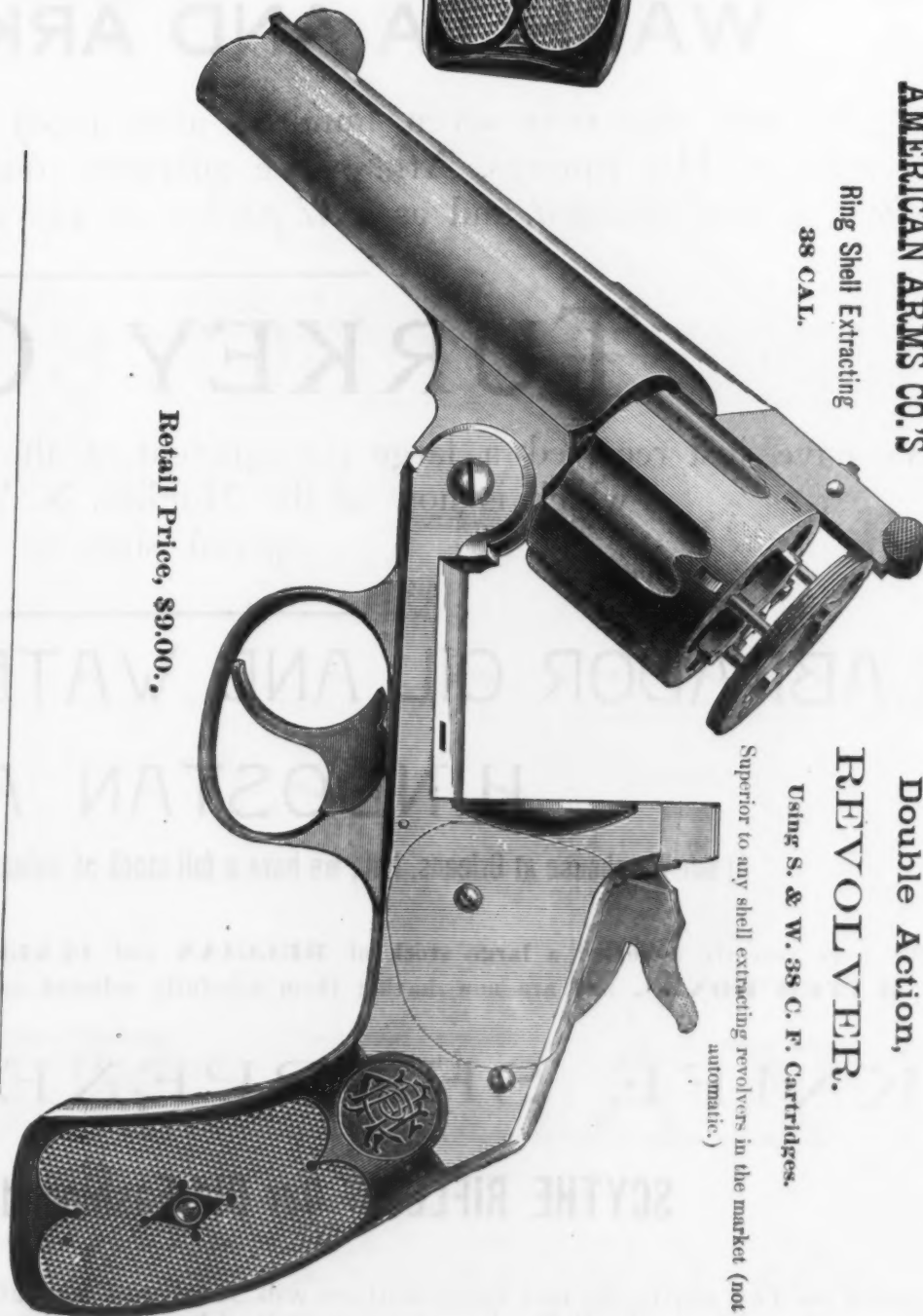


Single Action

Using the 38 Cal.
 S. & W. Cartridge.

Retail Price, \$7.50.

These (Ring) Shell Extractors are the strongest and simplest method of instantly extracting the shells yet produced. It cannot get out of repair, or get clogged up with dirt, from constant firing.



AMERICAN ARMS CO.'S
 Ring Shell Extracting
 38 CAL.

**Double Action,
 REVOLVER.**

Using S. & W. 38 C. F. Cartridges.
 Superior to any shell extracting revolvers in the market (not automatic.)

**AMERICAN ARMS CO.'S
 NEW, SEMI-HAMMERLESS, SINGLE BREECH-LOADING SHOT GUN.**



FOX'S PATENT BREECH-LOADING DOUBLE GUN.



RETAIL PRICES: Twist Barrel, (all improvements,) 12 bore, \$15.00.
 10 " 18.00.

These guns are so well known that further comments are unnecessary.

All goods manufactured by us are made of the very best material. The workmanship is first-class. For beauty of finish and elegance of model they have no equal.

ALL OUR GOODS WARRANTED IN EVERY RESPECT.

Descriptive catalogue of these guns sent on application.

For Sale by all the leading Gun and Hardware Houses in the United States and Canada.

MECHANICAL.

Water-Pipes.

Mr. A. H. Howland presented at the last meeting of the Engineers' Club of Philadelphia a paper on the general subject of "Water-Pipes." As to cast-iron pipes the author says: "In relation to the strength of pipes it is a simple matter to calculate the resistance of a perfect cylinder made of a certain quality of material against an internal pressure, but until you are willing to pay a fair price and insist upon good material and good workmanship we must pay for an excess of material sufficient to insure us against the poor quality of the material and the carelessness of the workman. Just what percentage to add to the minimum thickness of pipe for all these things is a little uncertain, but from a careful examination and study of all the data obtainable from 500 different works in the United States and Canada I have concluded that—for all we have to guard against either in quality or material, carelessness in manufacture, carelessness in handling or laying, or against water hammer—a factor of safety of 5 is ample, and this only on the larger pipes. At the present time it is perfectly feasible to obtain pipes made of material having a tensile strength of 18,000 pounds to the square inch, and with such material the minimum thickness of various sizes of pipe, together with their weights and ultimate strength, are as follows:

Internal diameter.	Minimum thickness.	Weight per ft. of cylinder.	Weight per foot of pipe laid, including bells.	Weight per length to lay 12 feet, including bells.	Ultimate strength if made of 18,000-pound iron.	One-fifth of the ultimate strength.
4	0.32	13.57	14.67	176	2,880	576
6	0.35	21.82	23.83	286	2,100	420
8	0.37	30.43	33.00	396	1,665	333
10	0.40	40.39	44.33	532	1,440	288
12	0.45	55.00	59.23	718	1,350	270
14	0.47	66.76	72.75	875	1,210	242
16	0.50	80.99	88.42	1,061	1,125	225
18	0.52	91.54	102.35	1,227	1,045	209
20	0.55	110.05	117.22	1,435	960	192
24	0.60	114.89	126.50	1,575	900	180
30	0.70	210.97	227.00	2,734	840	168
36	0.80	289.04	310.75	3,729	800	160
40	0.85	340.67	369.25	4,431	765	153
42	0.90	379.04	410.38	4,927	720	144
48	1.00	481.02	521.08	6,253	750	150

After discussion of the above figures and of the facility with which he considers a 6-inch pipe of but $\frac{1}{8}$ inch in thickness can be successfully tapped for service connections, the author proceeds: "In the reports from 38 different places using 24-inch pipes under various pressures, I find one place using pipe weighing as light as 182 pounds to the foot, which would be about $\frac{1}{8}$ inch in thickness; while another works, under the same pressure and probable circumstances, uses pipes weighing 306 pounds to the foot, or about 66 per cent. in excess of the lighter. I do not know that I have strength of conviction enough to advocate the use of 24-inch pipe only $\frac{1}{8}$ inch in thickness for any works where there is any pressure at all, although my estimates and figures show that it would be perfectly safe, but it is so radically different from custom that I have to a certain extent given away to custom and prejudice and have adopted as standard weights for all pipes used in works contracted for by myself, as follows:

Internal diameter.	Thickness, inches.	Weight per ft. of cylinder.	Weight per foot of pipe laid, including bells.	Weight per length to lay 12 ft.	Ultimate strength when made of iron having tensile strength of 18,000 pounds.	One-fifth of the ultimate strength.
4	0.40	17.27	18.73	225	3,600	720
6	0.42	26.46	28.92	347	2,515	503
8	0.45	37.33	40.40	486	2,025	405
10	0.50	51.54	56.17	673	1,800	360
12	0.55	67.76	73.75	885	1,650	330
14	0.58	85.02	90.77	1,088	1,490	298
16	0.60	97.78	106.78	1,281	1,350	270
18	0.64	117.11	126.67	1,520	1,260	252
20	0.70	142.25	153.43	1,841	1,200	240
24	0.80	194.77	210.38	2,524	1,080	216
30	0.90	270.00	285.33	3,364	1,020	204
36	1.00	362.22	390.50	4,696	1,000	200
40	1.10	443.82	490.58	5,770	990	198
42	1.16	491.49	532.42	6,399	965	193
48	1.30	625.16	681.58	8,170	975	195

Cement-lined pipes, so-called, are next discussed. Their mileage is given as next to that of cast iron, and the attractive feature of their cheapness in first cost noted. As to the results of their use the author says: "Three years ago I sent personal letters to every department whose address I could obtain throughout the United States and Canada that had ever used wrought-iron cement-lined pipe, and received a very large number of replies. From a careful study of these replies I find that the average life of the cement pipe, as usually made, was eight years, and that no place, with two exceptions only, who had had these pipes in use for a longer period than eight years recommended them. The objection to this class of pipe is: first, cement mortar composed of one-half sand and one-half cement is not an impervious material and water under ordinary pressure is forced to a greater or less extent through it, and so comes in contact with the shell, which it eats until it has no strength left, when the pipe is destroyed. In examining many miles of this pipe which have been taken out and replaced with cast iron I have noticed that wherever a joint was made and covered with neat cement the iron has been in almost as good condition as the day the pipe was laid, and this gives rise to the belief that a wrought-iron shell, lined and coated with neat cement, would have greater durability and life than one lined and coated with cement mortar. Whether such a pipe can be perfectly made or not is a serious question, and is the only question which prevents a much larger and more general use of this kind of pipe. The many manipulations necessary before the pipe is complete in the trench, and the fact that both the lining and coating depend for their efficiency upon the manipula-

tion of mechanics allows too many possible mistakes or errors to creep in and so render the pipe imperfect." Wrought-iron coated pipes are next considered, with their advantages, and the objections thereto on the score of durability, with the various processes which have been devised for their preservation. The author says: "It is my opinion that wrought iron pipes treated in some one of the methods indicated, or in some method yet to be discovered, will soon supersede in most cases all other kinds of pipe."

Wooden, earthenware, composition and glass pipes are noted in concluding the paper. All but the latter the author treats as of little general importance. As to glass pipes he says: "Glass pipes of large diameter have not been successfully produced, but it has been predicted by several large glass manufacturers that it will not be long before some method of casting these pipes successfully and cheaply will be devised. Made in form similar to our present cast-iron pipes, with some suitable device for a joint, and of a malleable glass, they would form a water-pipe to which there could scarcely be an objection; strong, tough, smooth and indestructible, and made of a material that is found almost everywhere. It is not without the range of probability that whenever a large quantity of pipe is to be used in any one locality a furnace will be erected and the pipes made where they are to be used."

Motors for Electric Lighting.

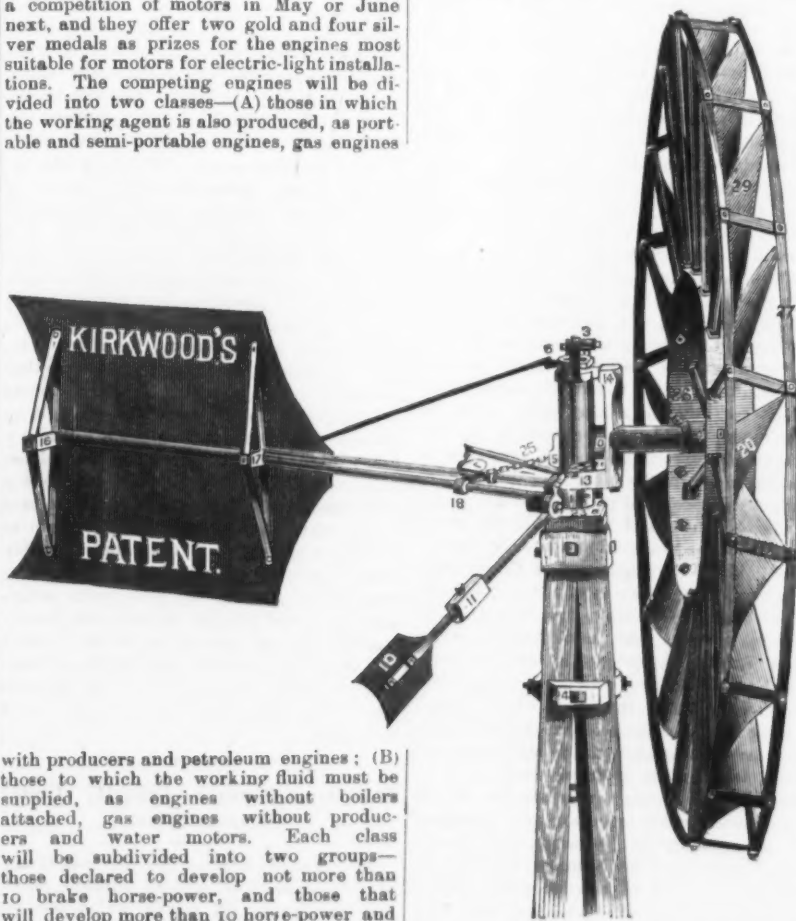
The difficulty in the way of domestic electric lighting does not arise from the skill required to work a dynamo machine, or even from the cost of the electrical installation, but from the trouble and expense incident to the working of the motor by which the dynamo is driven. If the public could be shown that the progress of invention had reduced the cost and risk of motors without decreasing their efficiency, it is certain that the new form of illumination would extend rapidly. To bring about this result the British Society of Arts, as reported in *Engineering*, have decided to hold a competition of motors in May or June next, and they offer two gold and four silver medals as prizes for the engines most suitable for motors for electric-light installations. The competing engines will be divided into two classes—(A) those in which the working agent is also produced, as portable and semi-portable engines, gas engines

A recent writer speaks of seven different lumber concerns in that region who have such roads already building, or will begin them early in the new year. Most of them are standard gauge roads, well graded, substantially constructed, and equipped with first-class motive power and rolling stock. They are roads which are in keeping with the business as it is conducted in that district, and it is not to be doubted that their projectors will find them eminently profitable. The building of them indicates that the lumber-makers there are enjoying a measure of prosperity, and that they see ahead the opportunity of selling a good deal of lumber. The fact of such heavy investments in the machinery of logging by the Pacific Slope operators indicates a purpose to cut liberally, which they would not be apt to entertain unless there is warrant in the outlook for an increased production of the mills.

Kirkwood's Wind Engine.

As noted by us a week or two ago, the Progress Engine and Machine Works, of Summerfield, Md., have acquired the sole right to build the Kirkwood Wind Engine, and are now putting it on the market.

We take pleasure in presenting this week an engraving of the engine, together with a brief description. The engine is made entirely of iron and steel. The wheel is composed of a cast-iron hub fitted to main shaft, the hub being flanged on the back and extending back over the bearing. By this arrangement the weight of the wheel is placed near the center of shaft and bearing, preventing, it is claimed, excess wear on the end of the bearing, making the wearing parts more durable and causing the wheel to run in lighter winds. Into the hub are screwed wrought-iron rods, extending outward to a rim of wrought iron and riveted to it. This rim forms the center of the wheel into which the vanes are secured. The vanes are made of sheet iron, the edges being rolled over steel rods threaded on the ends. The ends of the rods are placed in holes in the rim at the proper



The Kirkwood Wind Engine, Built by the Progress Engine and Machine Works, Summerfield, Md.

angle across the face of it, with nuts on the outside and inside of the ring. The vanes extend outward, with their extreme ends passed through openings in outside bands which encircle the wheel, and are secured in the same manner as in the central rim. Cross pieces are bolted from one band to the other. There are 36 vanes in 10 foot wheels, with two rods in each vane, forming 72 stay bolts to bind the wheel together, making it rigid and strong. The engine is claimed to be entirely free from such defects as the vanes becoming loose and blowing out, and liability to be torn to pieces in storms, and to present, moreover, a comparatively large surface to the wind. The design combines a maximum of strength with a minimum weight.

The tail vane or rudder is composed of two tail bars or tubes of wrought iron, their ends fixed in a casting on a vertical tube, and braced by rods extending from the top of this tube to the center of the tail bars. They are braced together at intervals by castings upon which the vanes are mounted and supported by flat bands and elliptical braces. The edges of the sheet iron vanes are rolled over rods to stiffen them, have the strongest as well as the lightest vane or rudder in use. As regards the governing principle, we would remark that the wheel is mounted on a bracket made to revolve on a vertical tube to which the tail vane is rigidly fixed. On the bracket is a circular flange; to this flange is attached a chain passing from the flange to an eccentric-shaped wheel, pivoted on and at right angles with the casting, to which the tail is fixed. The center of wheel is set $1\frac{1}{2}$ inches to one side of the center of the vertical tube, the wind exerting the greatest pressure on that side forces the wheel around in a storm parallel with the tail vane. This winds the chain on the eccentric bracket flange, draws on eccentric, and lifts the weight on the lever attached to the eccentric to a horizontal position. The eccentricity of the chain wheel increases

ing the resisting power of weight causes the wheel to offer greater resistance to the wind the nearer it approaches a parallel line with tail, and lessens the resistance as the wheel is drawn into the wind at right angles to tail. In this way a simple regulation is obtained, the action being quick and effective, never allowing the wheel to go entirely out of the wind and stop (unless pulled out) but causing it to run in storms as well as light winds with safety.

The weight to which we have referred is a thin flat surface set broad side to the wind at all times, but presenting no surface to the wind when the wheel is running full in the wind. The weight is then low down behind the wheel. When the latter is deflected out of the wind or pulled out to stop it, the weight is raised to a horizontal position on the end of the lever on opposite sides of center of pivot from the wheel, and at right angles with it, balancing the wheel on the tower, and presenting the same resistance to the wind as the edge of wheel. The shaft is of cold rolled iron and the bearings are long and recessed in the center to hold oil. The crank and wheel hub are neatly fitted to the shaft and keyed upon it; the connecting-rod is bushed with brass and can be replaced when worn at little expense; the motion is transferred from the crank by a connecting-rod to a rocking arm and then to the pump rod, doing away with sliding surfaces. The entire machine is mounted upon and revolves with a wrought-iron tube resting upon and projecting through the tower-cap down into the tower, and supported at its lower end by an iron step. This arrangement has proven to be a good and reliable pivot. We may add that these engines have been in use for the past four years with most satisfactory results.

Improvement in the Rider Hot-Air Engine.

Mr. Thomas J. Rider has recently effected an improvement in his well-known hot-air engine, which is put on the market by the Delamater Iron Works, of New York. In hot air engines the hot piston, which is commonly of trunk form, works within an angular packing of leather or analogous material, which is liable to injury from heat, at the top of the hot cylinder, and unless some precautionary measure were taken the packing would soon become destroyed or greatly deteriorated by the heat transmitted to it through the metal of the cylinder. The upper end of the cylinder has usually formed the bed upon which one face of the packing rings rests or is secured, and there has been nothing to break the continuity of conducting surfaces from the hot body of the cylinder direct to the packing. In order to temper the heat of the upper portion of the cylinder close to the packing, it has been usual to surround that part of the cylinder by a water-jacket and supply water thereto for circulation, in order to prevent injury to the packing by the excessive heat.

The object of Mr. Rider's improvement is to break the continuity of metal between the packing and the hot portion of the cylinder, and by a very simple construction to enable the water-jacket around the hot cylinder to be dispensed with. To this end it consists of a ring made separate from and secured to the cylinder. Upon this the packing is supported, and the continuity of metal in the cylinder is thus broken between the hottest part of the cylinder and the packing, and the latter is preserved from the injury without the employment of a water-jacket. It is known that the conducting power of metal is greatly reduced by joints in it even though such joints are formed by metal parts in face-to-face contact. Accordingly Mr. Rider makes the ring or rings which support the packing separate from the cylinder. If desired, paper or other material which is a poor heat-conductor may be interposed as a packing between the top of the cylinder and the ring or rings which directly support the packing-rings of leather or other material.

The Strong Locomotive.

Since the Strong locomotive was first brought out, a little over four years ago, important modifications have been effected in its design, and the engine as it is at present embodies many new and interesting features. Opportunity to examine these was given us on Thursday last, December 30, Mr. Geo. S. Strong having kindly tendered us an invitation to inspect the engine running under actual working conditions on the Wyoming division of the Lehigh Valley Railroad. Leaving the Pennsylvania Depot at Jersey City at 8 15 a. m., Mr. Strong's party, which received additions at Newark and Bethlehem, Pa., and consisted of Messrs. A. G. Darwin, E. N. Lewis, Henry G. Morris, John Henney, Superintendent of Motive Power of the New York, New Haven and Hartford Railroad, C. S. Davidson, superintendent of the Hartford division of the same road, and several others, including the writer, reached Whitehaven, Pa., early in the afternoon. From this point over the mountain to Wilkesbarre and back the train was drawn by the Strong engine, No. 444, an 11-mile grade of 65 feet to the mile being encountered on the way there and a 12-mile 95-foot grade on the return. The regular eight and nine car passenger trains, Nos. 15, 2, 9 and 8, running on this division are ordinarily hauled up these grades by two of the regular engines used on the line, the speed under these conditions being at the rate of 30 miles an hour for the 95-foot grade. Making two stops on the line the Strong locomotive alone has pulled the trains over the 12-mile stretch in 27 minutes, and, without stops, in 20 minutes, performances of which Mr. Strong has every reason to be proud. We should add here that the engine has 20 x 24 inch cylinders, six 5 foot 2 inch drivers, and weighs about 137,000 pounds. Of this weight 90,000 pounds are carried in on the drivers. Dirty pea coal, valued at about 60 cents per ton, is burned, and we understand that Mr. Strong's engine is the first one that has been able to bring the trains in on schedule time with this fuel; the coal used on the regular passenger engines costs \$2.10 per ton. On the trip from Whitehaven to Wilkesbarre and back again the engine gave every satisfaction that could reasonably be expected, and in a few days, when proper draft regulation has been secured, will be put into regular service on that divi-

on. The ride over the mountain was thoroughly enjoyed by the visitors, and every possible facility was afforded them for a study of the peculiarities of the design of the locomotive.

Concerning these, we will say that, as in Mr. Strong's earlier engine which we described some years ago, the boiler, which in the present case was 33 feet 3 1/2 inches long, has two fire chambers, each consisting of a welded and corrugated steel cylinder. Both are joined to a single combustion chamber by corrugated hemispherical junction plates so formed as to avoid having any flat surfaces as in the old design, and to do away with the necessity of stays. There are 300 1 1/4-inch tubes, 11 feet 5 inches long. The fire chambers are each 42 inches in diameter and 9 feet long; the total grate area is 62 square feet, about double that of ordinary engines, and the total heating surface is 1848 square feet. Wrought iron air pipes are, moreover, arranged between the grate bars, opening into the atmosphere and discharging their supply of air into chambers at the ends of the grates and lined with fire clay and asbestos. From these chambers the heated air issues in a number of small streams into the combustion chamber. The furnaces are fired alternately, so that the rich gases evolved from the green coal on one side are ignited by the heat of the incandescent fuel on the other, utilizing to the greatest possible extent the calorific value of the fuel. It is an interesting fact that the cylinders of the engine have no steam chests, the valves being interposed in the steam passages. These valves, of which there are four, two steam and two exhaust, are of the gridiron type, each having 10 ports, and when wide open yielding a passage 3 1/2 inch wide and 46 inches long. The fact that there are four valves makes the steam and exhaust entirely independent of each other permitting an early cut-off, and at the same time a late exhaust closure, producing a very free exhaust. The advantage of this was shown most strikingly in a number of interesting indicator cards which Mr. Strong had taken from the engine, and which we were favored with seeing. Unlike the arrangement adopted in Mr. Strong's earlier locomotive, the motion for the valves is derived from a single eccentric for each cylinder, and the valve gear works entirely on true centers, giving a good distribution of steam for either forward or backward running, and, while the motion for both steam and exhaust valves originates from this single eccentric, their motions are entirely independent, and are under control separately. The motion of the valves is so arranged that when a valve has covered its ports it comes almost to rest while the load is on it, and moves rapidly at the period when it is relieved of wear by compression and expansion, and, as the travel of the valves is very much reduced, being but 1 1/4 inch for full travel and 1/2 inch on steam valves, when cutting off at an early point, the wear is much reduced.

The forward pair of drivers have blank tires while the others are flanged. The total wheel base of the engine is 32 feet. We may add that the longitudinal seams in the boiler are welded. The boiler was built at Edgemoor, but the rest of the engine has been constructed at the Wilkesbarre shops of the Lehigh Valley Road, under the superintendence of Mr. Alexander Mitchell. The engine is very ingeniously designed and well finished, and rides very smoothly. The patents are owned by the Strong Locomotive Company, of New York, which has a capital stock of \$1,200,000. A. G. Darwin, ex-president of the Allen Paper Car Wheel Company, is president; George D. McCreary, of Philadelphia, vice-president; Henry G. Morris, of Philadelphia, secretary and treasurer; and Geo. S. Strong, engineer-in-chief. The directory consists of the above-named officials, together with George H. Myers, president First National Bank of Bethlehem, Pa.; Thos. F. Rowland, president of the Continental Iron Works, Brooklyn; and C. C. Worthington, of H. R. Worthington & Company, pumping engine builders.

A Driving Joint.

An ingenious driving joint that has all the movements of a universal coupling is now being introduced by the Universal Joint Company of New York. One shaft is connected with the other by two hemispherical gear wheels. These wheels are held in mesh by linkwork and segment gears that retain the spherical wheels on their centers in every position of the shafting. The joint can turn in any direction giving any angle within a radius of 360°. The speed with which it can be driven is stated at the wide range of from 100 to 2500 revolutions a minute, making it applicable in many places where light power is used, such as for polishing, drilling, boring and numerous places where a flexible joint is wanted.

A Cable Road in China.

At Hong Kong a cable road is constructed from the town to the Peak, a range of very steep hills, on which are fine villa residences, and where the climate is more salubrious than near the harbor. The incline where they have to work is 4800 feet long, and the line, which is partly single and partly double, is laid with 35-pound steel rails on steel sleepers. The gradients vary between 1 in 2 and 1 in 10, closely following the natural contour of the ground. The total height to which cars have to be raised is 1300 feet, and the ropes, of which one is the working rope and the other the safety rope, run on separate sets of friction rollers. The cars are attached to each end of the ropes, and as one pair of cars ascends the incline the other pair descends. Each car is to contain 60 passengers, the maximum load being 7 1/2 tons at each end of the ropes. The working rope is passed over a pair of drums 8 feet in diameter, and the safety rope over one drum, the drums being fixed at the top of the incline and driven by two compound steam engines, 40 nominal horse power each. The speed of the cars is to be 6 miles an hour.

In London, Manchester, Liverpool and Glasgow telegrams are said to have been transmitted by air pressure for more than 30 years past.

The Iron Age

AND METALLURGICAL REVIEW.

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The Opening of 1887 and of 1886 Compared.

A comparison of the condition of the iron trade at the opening of 1886 with that of 1887 is profitable, because suggestive in many respects. A review of the market at the beginning of the former year developed the fact that what quickening in the demand there had been was due to heavy purchases of the railroads. The rail combination had proven its ability to withstand a critical period. A large number of old-established roads had completed arrangements to build extensions and feeders, so that at least one great branch of the trade, the steel rail industry, was in fairly prosperous condition. This induced a heavier demand for raw materials, and thus incidentally aided allied industries. But outside of this demand for track material, the only notable feature was the large quantity of material required for natural gas pipe. Though effected by the check given to business generally through the labor troubles of the year, the trade began to gather strength steadily after midsummer, and it began to grow more and more evident that, in spite of an enormous capacity slowly called into play, consumption was fully able to cope with make. One by one new factors have come into play. The renewal and increase in development which was confined to roadbed last year has spread now to rolling stock and equipment. One by one car shops, locomotive works, bridge builders, &c., have seen their order books fill up, starting a rising tendency, which has brought out consumers and dealers generally. The result has been a heavy demand for raw materials, and speculation has in a moderate degree contributed to lift notably old rails. The leading point of difference between the opening of 1886 and of 1887 lies first therefore in the fact that the improvement, which was confined to one or two specialties, has now extended to every department of the trade with scarcely an exception. But even in the one branch which was growing conspicuously prosperous a year ago, a marked increase in the volume of business should be noted. Orders nearly double in amount have been placed, though it should be distinctly brought out that the average of quotations both of the 1886 and of the 1887 sales is far above the actual prices received. We question whether the prices received for contracts for 1887 delivery averaged above the equivalent of \$33.50 at Eastern mills, though now the asking price is \$36.50 to \$37. In other words, the advance of the past month has not yet benefited the mills much, and is only important as establishing a higher plane of values for the sales to be made at a future time for the

balance of the 1887 capacity of the rail works.

In addition to the heavy prospective increase in the demand for rails and for railroad equipment, there is every evidence of a much livelier inquiry for iron in every other form. On a smaller scale than the railroads, but still in a similar manner, our people have in many ways economized for years. Consumption had not quite kept pace with depreciation, waste, and with our natural increase in population. The purchases thus put off are now being made, and to them are added the heavy buying of distributors and dealers which always accompanies a rising market. In this respect the condition of the trade differs strikingly from its temper a year since. Then few had faith in our improvement, and buyers stubbornly and successfully resisted advances.

The iron trade must now face the question whether it is in the power of sellers to keep prices from rising too rapidly, and if it is to what extent an upward movement can be checked. Iron and steel manufacturers, after a long period of unprofitable work, are entitled to all the benefit there may be to them in the present prosperous condition of the trade. This feeling is naturally very strong, and what danger there may be lies in the direction of going too far. The question now depends upon whether we can supply our own wants with our own raw materials and plant, or whether we must call for foreign aid. On the one hand, there is no doubt whatever that we are crowding home capacity at a very sharp rate. Our works were under full tension during the second six months, and the product during that period will give a much better idea of what we may be able to do in the near future. The secretary of the American Iron and Steel Association has estimated the total product of pig iron for 1886 at 5,600,000 gross tons. That would make the growth of the product from the first half of 1885 to the last half of 1886 as follows:

	Pig iron, gross tons.
First half of 1885.....	1,920,371
Second half of 1885.....	2,124,154
First half of 1886.....	2,637,687
Second half of 1886.....	2,950,000

Now we are running at even a faster rate than the average of the last six months of 1886, and are certainly turning out more than 500,000 tons a month.

The same authority quoted above puts forward the following valuable estimates:

Products.	1886—Gross tons.	1886—Gross tons.
Pig iron.....	4,914,528	5,300,000
Bessemer steel ingots.....	1,519,480	2,000,000
Bessemer steel rails.....	959,471	1,500,000
Open-hearth steel.....	133,375	200,000

We recently published an estimate of capacity of the rail mills, which will, according to present prospects, be fully occupied, leaving a considerable business over for foreign rails, rail blooms, billets and slabs. One fact should be particularly noted: Our rail mills have covered their requirements for more than half of the current year, and that without as yet drawing even as heavily as last year upon foreign markets. From that quarter we do not for some time to come look for any buying which might aid a rapid rise in prices. It looks more dangerous so far as mill irons and foundry grades are concerned, and it is a striking fact that the puddling furnaces which one year since were believed to be doomed to inactivity forever are running to full capacity. So far as it is possible to judge now we do not need much, if any, Bessemer pig, except for special purposes. By far the greater part of the spiegeleisen and ferro for 1887 has been bought. In foundry irons there may be a heavier movement than last year, and if the scarcity in mill pig in the West continues we may once more witness imports from Middlesboro'. Heavy orders for crude steel in many forms have already been placed, and additional quantities may be needed. So far as old material is concerned it is a very dangerous impression, which appears to have been carefully fostered of late, that the quantity of old rails available in this country is comparatively small. That is certainly not the case, since at the close of 1885 there were nearly 62,000 miles of road laid with iron rails. High prices in the spring may bring out a good deal of this material, provided, of course, that the new steel can be secured at moderate figures.

Reviewing the situation to-day we are impressed with the fact that our large productive capacity is able to cope with a far greater demand than is generally believed possible, and we sincerely join in the opinion expressed recently by the secretary of the American Iron and Steel Association: "Speaking generally, prices must stop where they are or we will have such an influx of foreign iron and steel in 1887 as we have rarely if ever experienced. We need not dwell on the consequences which would be sure to follow."

We note with interest that measurements of slide-valve friction are reported as being made on the Chicago, Burlington and Quincy road, the intention being to demonstrate the percentage of power required to move different kinds of valves under the varying conditions to which they are subjected in service. Of the different lines of investigation pertaining to the economic utilization of steam-power that embracing such friction tests has been very greatly neglected, and any figures bearing on the subject and derived from actual experiment will therefore

be gladly welcomed. While the Chicago, Burlington and Quincy tests have not yet, so far as we know, developed anything of specific value, they show an increasing appreciation of the importance of the matter and the need of trustworthy data. The trials are, no doubt, specially intended to determine locomotive slide-valve friction, but with the work once started there is reason to expect that it will be extended generally and not confined to one class of engines or valves.

The European War Menace.

Although for the moment the apprehension of a war between leading Continental nations has abated somewhat, the spirit animating the governing power, and to some extent the people, of at least two of them has by recent occurrences been stirred up again. The one or the other for reasons of military expediency may suddenly resolve to begin the fight, and the immediate and remote consequences would be indirectly brought to our own door so inevitably that a general review of the matter as it stands may not be out of place. Time heals many a wound among individuals as well as among nations. The hatred which the Napoleonic wars had engendered between England and France, with Waterloo as the final struggle, was obliterated in great part in a decade. It is different, however, with the Franco-German war of 1870-71, although it was comparatively short. There was in the first place the humiliation of a campaign in which the French for the time being lost their prestige as the first military nation of Europe, and which cost them 5,800,000,000 francs in money and the valuable industrial provinces of Alsace-Lorraine. Fifteen years have gone by and yet there is not a Frenchman, we believe, who, however peacefully disposed he may be, does not harbor in his mind revenge and hope for the recovery—at the sword's point if need be—of the lost provinces. Whoever has carefully read the French papers for a couple of months past must arrive at this conclusion. Although the French public indebtedness amounted last year to 19,656,045,076 francs, the total deficit since 1874 having been 6,330,000,000 francs, more money is now asked by the Minister of War to complete the organization of the army.

The numerical strength of the French army on a peace footing is at present 471,811 men, that of Russia 614,702, and that of Germany 427,274. This being the case, a Federal Government bill was introduced into the German parliament to add permanently to the latter number 41,000 men, so as to restore the equilibrium between it and the French army, without special reference to the Russian; at the same time the military budget was proposed to be fixed for seven years to come, and the additional army strength to be rendered available by April 1 next. While the population of France was, according to the census of 1881, 37,672,048 souls, that of Germany was found to be 46,852,450 last year, and that of European Russia 85,296,479 in 1882; hence the French peace footing is proportionately very large in point of numbers. During the discussion of the French plans of army organization, the public mind was being worked up to fever heat, and as Russia's threatening interference in the Bulgarian troubles simultaneously provoked severe criticism in Germany, the French loudly advocated an alliance with Russia upon the strength of the supposed ill feeling existing between the Russians and Germans. The coquetting with Russia on the part of France immediately provoked a counter move by Germany. A sort of *carte blanche* was given by the latter to Russia in this Bulgarian affair at the risk of alienating the good will of Austria-Hungary, Germany's close ally, opposed to the extension of Russian influence, however legitimate, in the Balkan Peninsula. Checkmated in this plan of a Russian alliance, the French press and representative men gradually lowered their tone, and the impression began to prevail that the critical moment had passed by, and that peace would be preserved this time at least. The cabinet crisis in France also proved a partial diversion, and there are now even rumors of a close alliance between Germany and Russia, or, in default of it, of a renewal of the compact between the three empires to maintain the peace of Europe. These rumors may, however, have been set afloat for stock jobbing purposes merely.

The Government bill is likely to be adopted by the German Parliament, every effort having been made to impress that body with the necessity of its passage. After the Federal Government shall thus have gained its point it is fair to presume the war cloud will be considered as having blown over. But there are a good many well-informed people in Germany and out of it who think differently. These say that since the French, after a lapse of 15 or 16 years, are not prepared to philosophically submit to the results of the war they provoked and endorsed and fought to the bitter end. It would be folly to allow them to go on strengthening themselves for a war of revenge they declare to be inevitable. Field Marshal Moltke the other day plainly gave the French to understand in his speech in the German Parliament that a retrocession of Alsace-Lorraine was out of the question, implying thereby that the ceded province would have to be fought for if France wished to reacquire the same.

But the military men who share Moltke's views deem it a ruinous affair to go on keeping up an enormous peace establishment and quietly wait till it suits the French to begin. They advocate a peremptory demand of disarmament within a given time, and if France declines, the immediate invasion of that country; they assert that even now they can in seven days throw 900,000 men across the frontier. Barbarous and indefensible as such a method of picking a quarrel during profound peace would appear from a humane and international point of view, the advocates of it in German military and diplomatic circles are no doubt legion; and here lies the real danger of the situation, for the mine may be sprung at any moment from now forward, even though the present Emperor of Germany be still alive, and in spite of his repeated declarations and well-known desire not to take a share in another Continental war.

Whether Austria, Russia and Italy might be drawn into the struggle if it should thus be precipitated, we shall not now examine, because it would be useless to do so, and would lead us too far. If neither of the three took a hand in the strife, the latter might terminate after some few gigantic battles had settled the question either way. But as the destinies of two powerful nations will not unlikely be at stake for a generation to come, the war may go on longer than the last, especially if success on both sides should vary without being decisive, trembling in the balance for a year or two. This may not be probable, but it is at any rate possible. The disturbance in trade and finances on both sides of the Atlantic—should such grave events come to pass—would of course be great. If war broke out at any time this year it would spoil a great deal in the way of business now apparently bright and promising. It would on the other hand give a great lift to many interests of neutrals like ourselves, especially in the ocean carrying-trade. A couple of million men withdrawn from husbandry and active industries in two countries of such magnitude in the very heart of Europe, every able-bodied man up to a certain age being enrolled either in the active army or reserve, rich or poor, would make a wide gap in production, while they all have to be fed, and fed well. Finances would be profoundly disturbed, and, high-priced and not overabundant though prime American securities are at present, there would be an active demand for them, inasmuch as nobody could say what the other leading powers, including England, might be compelled to do were the struggle to become apparently interminable. While a great many European securities would become unsettled and weak there would be a great demand for gold, as is always the case during war times. But it would be vain to attempt a sketch of all that might possibly occur in commercial and financial as well as shipowning matters at this early stage, when the chances seem that all will pass by quietly, and that, gloomy as the outlook may still be politically in Europe for the present, the year may be one of the best business years there and here we have seen for a long time.

The Blast-Furnace Capacity Under Construction.

Now that the demand for pig iron is taxing the capacity of existing furnace plant, and the list of old stacks which may be made available for production is narrowing down to a very small number, one of the most important questions affecting the supply of pig iron in the near future is the number of plants now under construction and the time when they will be able to appear as sellers. We have sought diligently to obtain full data on this subject and have gathered by direct inquiry and through other channels data which possibly not complete will at least furnish some cue.

The most important movement, and at the same time the one involving most uncertainty, has been in the South. We have in the past been conservative so far as the opening up of the resources of the South is concerned. Our course has been largely criticised in that section with the mistaken idea that we were endeavoring to shield the iron-masters of the Eastern States against being "wiped out" by their new rivals. On the other hand, we have been accused by those so dangerously threatened of giving undue encouragement to investment in Southern property. Such views expressed by the extremists of both parties give rise to the belief that we have succeeded in avoiding the danger of being carried away by the optimists or of being blinded by the prejudices of the pessimists. The *Iron Age* stands above sectional interests, and would be alike guilty of a departure from its aims and traditions if it were to exalt the future of Southern iron enterprises or belittle the dangers growing out of their competition to Northern ironmasters. Looking beyond the motives which may prompt the action of individuals for the sake of immediate gain, we have in the past and shall in the future earnestly advocate a course which we believe will most benefit a great industry as a whole. We have vigorously protested against the misrepresentations of the boomers, and are sure that the wild speculation now going on in some parts of the South is certain to react injuriously upon the community and upon a rising

industry, however well it may fill the coffers of a few who are quick enough to "get out" before the ebb sets in. Hardly a week passes but that one or two projects of furnace plants come forward in the South. These for the present the iron trade has little to do with. There is strong evidence that some of them are contingent upon and auxiliary to "booming" the town lots of some particular land company. Since it will take from one to two years before such projects will play a factor at all in the pig market, we may dismiss them at once and turn to those enterprises which are in a sufficiently tangible shape to merit the attention of consumers of pig iron. As soon as that test is applied the large numbers which figure in much of what is written about the Southern iron industry disappear quickly. Yet enough remains to be an important factor in the trade during the year 1887. Tabulating the plants under construction we have as follows:

Coke Furnaces Building in the South.

Company.	Date of completion.	No. of furnaces.	Dimensions.	Capacity per week.
Lady Ensley Furnace Company.	Oct. 1.	1	18 x 75	700
Sheffield Furnace Company.	July 1.	1	17 x 75	650
De Bardeleben C. and I. Co.	July 1.	2	17 x 75	1,200
Pioneer Mfg. Co.	Oct. 1.	1	17 x 75	600
Woodward Iron Company.	Jan. 1.	1	17 x 75	600
Tenn. C. and I. Co. (Pratt).	Oct. 1.	4	20 x 80	2,600
Tenn. C. and I. Co. (So. Pittsburgh).	Oct. 1.	1	18 x 75	600
Ashland Coal and Iron Company.	June 1.	1	16 x 64	400
Total.....		12		7,450

In detail we may note the following: The Lady Ensley Furnace Company, of Sheffield, Ala., of which Enoch Ensley, of Pratt Mines, P. O., Ala., is president, is commenced, and all the contracts for machinery, &c., have been let. The Sheffield Furnace Company, Horace Ware, Birmingham, president, has done nearly half the work in the erection of its furnace, which will be 17 x 75 feet, and like the preceding furnace will be equipped with three 18 x 50 feet Whitwell stoves. We may add that they are taking steps to enter into contracts for the erection of a second furnace. The furnaces and stoves for the two De Bardeleben furnaces are better than half done, and will, it is expected, blow in about July 1. The furnace of the Pioneer Mining and Mfg. Company, of which Samuel Thomas is president, has progressed considerably, and may be in operation in the fall. Woodward No. 2 is ready to go into blast. For the four Pratt furnaces of the Tennessee Coal and Iron Company the foundations are laid and part of the superstructure is ready. They will probably be blown in at intervals from October to December. The same company are adding a second furnace to their South Pittsburgh plant, the stack being about half completed. One enterprise which may be in working shape this year are the two furnaces of the Woodstock Iron Company, at Anniston, Ala., which, according to Mr. S. Noble, will be completed before the close of the year, and will be the largest in the South, with a weekly capacity each of 1000 tons.

It will be observed that we have not included in this list a number of plants which many have believed to be much further advanced. The Alabama and Tennessee Coal and Iron Company, of which E. W. Cole, of Nashville, is president, have contracted for all the machinery and appurtenances for their three furnaces. One of these furnaces is to be in blast January 1, 1888, the second June 1, 1888, and the third January 1, 1889. The Sloss Iron and Steel Company have, we understand, part of the money in one of the Birmingham banks for the erection of two more furnaces, but it is certain that the new plant will not be in productive shape during this year. The Coalburg Coal and Iron Company are often referred to as building. Thus far they have only the rock on the ground for one of the stacks, and, so far as we know, the contracts for equipment have not yet been placed. The Birmingham Furnace and Mfg. Company, recently organized, may commence work on two furnaces in 1887. Another concern projected a considerable time since is the Sequatchie Coal, Iron and Railroad Company, who bought and paid for about 75,000 acres of coal and iron lands, and purchased a site for two furnaces at South Pittsburgh, the outlay being about \$200,000. It is reported that fully \$700,000 have been subscribed, and that the contracts for erection have been placed, but that no work of construction has yet been done, because the Louisville and Nashville Railroad have declined until lately to grant sufficiently low freight rates. Another enterprise in abeyance is the building of a furnace at Chattanooga, for which \$150,000 had been subscribed. Some of the promoters withdrew by reason of a disagreement concerning its location, but it is stated that the plant will be built in spite of their withdrawal. In addition to the furnaces named above, there are a number of charcoal furnaces under way. We have not the space to allude to a large number of other projects which may or may not ripen during 1887.

A year hence the capacity of the coke furnaces of the South will be greater by at least 7450 gross tons per week, our figures being as a rule placed lower than the estimates of owners or contractors. All the

plants are of modern design, well equipped, and may be expected to run close up to capacity. With the others in contemplation this looks ominous enough for the year 1888. It will much less affect 1887. Making due allowance for the fact that delays always will occur before blowing in, we have roughly estimated that the new plants which will go into operation this year in that part of the country will turn out from 100,000 to 125,000 tons, nearly all of it during the second half of the year.

In other parts of the country the number of furnaces in course of construction is, comparatively speaking, small, although some of them will be of large capacity. We may tabulate them as follows:

Company.	Date of completion.	Number of furnaces.	Capacity per week.
Troy Steel and Iron.....	Feb. 1, April 1, June 1.	3	8,150
Allentown Iron Company.....	May 1.	1	400
Robert Hare Powell's Sons.....	May 1.	1	500
Valentine Ore Land Association.....	May 1.	1	500
P. F. Collins & Co.....	June 1.	1	600
Edgar Thomson.....	May 1.	1	1,500
Laughlin & Co.....	May 1.	1	1,300
Etna Iron Works.....	May 1.	1	500
Total.....			7,800

The Troy Steel and Iron Company are building three 18x80 furnaces, with 12 20x80 foot Whitwell stoves. The furnace of Robert Hare Powell's Sons will be 17x70 with three 18x50 foot Whitwell stoves, while the stack being built by the Valentine Ore Land Association will be nearly identical in size, while P. F. Collins & Co. are building a large furnace, which, too, will depend upon utilizing the cheap and abundant ores of Centre County, Pa. We understand that the latter firm contemplate putting up a second furnace, and that negotiations are progressing for a 60-ton furnace for the Bellefonte Iron and Nail Company. In the Pittsburgh district the Edgar Thomson Works are adding another great producer to their magnificent furnace plant, and Laughlin & Co. are also putting up a large furnace. Generally speaking, it may be stated that west of the Allegheny Mountains progress during the past year has proceeded rather in the direction of remodeling older plant and thus providing additional capacity. In the aggregate this has amounted to far more than is generally believed, though it is practically impossible to numerically express it. It will be observed that the greater part of the capacity under construction in the table just quoted will become available for production comparatively early in the year, so that the addition to the make through its instrumentality will not be less than 175,000 for the year 1887.

In the aggregate, therefore, the new furnaces which will one by one swing into line during 1887 will contribute to the aggregate output of the year by about 300,000 tons for the coke and anthracite furnaces. It will be readily understood that the great bulk of this addition will come toward the end of the year, when the capacity of the country will be increased by a weekly aggregate of nearly 16,000 gross tons. For the first six months the trade, however, will be dependent almost entirely upon the blowing in of furnaces which have been idle for years. In that direction, as is well known, there is considerable activity, though the individual furnaces are generally not capable of turning out heavy amounts. Meanwhile the source of supply, the importance of which we have endeavored to gauge, must not be lost sight of either by producers or by consumers. To neglect it would precipitate a rise, with its attendant evils, from which the reaction would be all the more severe when forced by new producers as unexpected sellers.

The Cornell Law School.

We have received a copy of the recent report of a committee of the Board of Trustees of Cornell University upon the Law Department which it is announced will be established at that university at the commencement of the next college year. This report was submitted to the full Board of Trustees and adopted on October 27 last, and contains an outline of the plan proposed and approved by the Board at that meeting, so far as it is possible at present to decide upon its details. Much is to be left to the future, when the actual operation of the new department shall have settled many questions that to-day cannot be determined. The following are the main points of the report: The length of the course of instruction is intended to be three years, of which two are to be passed at the University and one in the office of some member of the profession already in full practice. This last is demanded by the laws of the State of New York, which permit no one to practice until he has had at least one year of apprenticeship, if we may so term it, with a member in good standing at the bar. The diploma of the university is delivered at the end of his university course of two years, as at other law schools, the degree conferred being that of LL.B. Two classes of students are to be provided for—the one the regular graduates of the university remaining for a post-graduate course of professional work, the other the men who, having neither the time nor the means to secure preliminary collegiate courses of instruction, must come

in from the preparatory schools or from business life. In the latter case the requirements are to be the same as for other courses in the university. For the first class of students the presentation of their diplomas secures admission to the law school. The work in the law department is to be supplemented by courses in the other departments of the university where desired, and it is intimated that the department of history and political science is to be given a form and organization that will make it particularly useful to such students as can take its courses. Studies in the university, in the constitutional history of England and of the United States, in the development of the history of common law and of civil law, in the history of political theories and practice and in the evolution of jurisprudence as a science are expected to so supplement the studies in the law school as to greatly benefit the student. It is asserted that Cornell University possesses peculiar facilities for work of this kind, and that she already has a faculty in this branch which is exceptional in numbers and strength. The initiative of President White and the special interest felt by both the first and the present head of the university in this line of studies, in which they are both working and distinguished, have made it certain that Cornell will always be strong in such branches.

The statement of the character of the proposed courses of instruction is, as would be expected at this stage of the work, very brief; but it is stated that the study of municipal law may be expected to be given much attention, as in every other law school. Nothing is said of those branches of law which are, it may be presumed, of especial interest to the class of students who pass through a university of which, as at Cornell, the prescribed work is that which is most closely related to the useful arts. We understand that the special work of that university is indicated by its charter, and that, like all the "land-grant colleges," it must give particular attention to all that relates to the promotion of agriculture and the mechanic arts. The endowment of the institution having been made with this object in view, it may probably be safely assumed that the university will, in its law school, secure full provision for the instruction of its embryo engineers and agriculturists and for the graduate demanding such instruction in those branches of law in which they are likely to be interested, and a knowledge of which is to them no less essential than the elements of common law. We may expect the law department of Cornell University to become famous in time, for its development of the courses of lectures on patent law, the law of contracts, &c., and for the character and fame of its lecturers in these branches. A great field is here open, and more probably to that university than to any other. Such specialization naturally brings this side of the law to that university. We will venture to assert that her trustees will take advantage of their opportunity. In this report, it is stated that it is proposed to secure non-resident as well as resident professors, and this will afford a means of securing lectures by the best experts in those branches to be found in the country—men who are altogether too well situated in their practice to be seduced into the professorial chair by any compensation that any college can offer. The development of these branches having especial importance to the practitioners of scientific agriculture, and of the various branches of engineering, will afford justification, if any be needed, for the application of the endowment of this land-grant college to the support of a law school.

The low price at which wheat is now selling is calculated to excite some surprise, especially among those who are in a position to know the statistical position of that staple. During the last four months of 1885 the price averaged 98 cents per bushel; during the past five months it has averaged 89 cents; and yet the available supply, including that estimated to exist, but commercially "invisible," is admitted to be considerably smaller than at this time last year—according to recent statistics some 18,000,000 bushels less. The Cincinnati Price Current gives the following comparative totals:

	1885.	1886.
Available supply July 1.....	32,000,000	100,000,000
Crop.....	455,000,000	357,000,000
Total.....	487,000,000	457,000,000
Exports 5 mos. to Dec. 1.....	65,000,000	32,000,000
Consumption.....	118,000,000	115,000,000
Seed requirements.....	53,000,000	53,000,000
Total.....	236,000,000	200,000,000
Available supply Dec. 1.....	249,000,000	257,000,000

This comparison shows the available supply on December 1st 12,000,000 bushels less this year than last, with a more active export demand. Under such circumstances it would be natural to expect an advance in wheat, but it appears to show no disposition to respond to the opportunity.

The most common adulterant of white lead is permanent white or sulphate of baryta. This admixture may be recognized by boiling a small quantity of the pigment in a glass test tube or flask with nitric acid diluted with an equal measure of water. The white lead dissolves, but any sulphate of baryta remains as a white residue. The residue should be allowed to settle, the clear liquid poured off, and the deposit again treated with nitric acid and then boiled with water.

The Gogebic Iron Range.—V.

BY JOHN BIRKINBINE, PHILADELPHIA, PA.

The inherent value of the iron ore deposit, the apparent quantity of the ore and its superior quality naturally drew attention to the Gogebic iron range, and options have been taken upon most of the property through which or near which the ore-bearing rocks are presumed to lie. It is upon these options that some very handsome "turns" have been made. In one instance an option was taken on 80 acres, and explorations carried on until about \$1800 had been expended, when, as the show of ore was good and the property was adjacent to a large producer, the option was purchased from the explorers for \$100,000. For this sum the purchasers have the right to mine ore from the 80 acres and pay a royalty, reported as 50 cents per ton for all ore mined, to the owners. The plans of options vary, sometimes a bonus being paid for the option, and in other cases no payment is required; but the prospector is given an option of lease if he will within a specified time make a proper effort to find ore and show 10,000 tons "in sight." Upon such showing a lease is drawn upon a basis previously agreed upon, but which generally stipulates a minimum annual output, or rather a minimum annual payment of royalties, which, however, may be offset by larger outputs in the future.

THE COST OF MINING.

In any estimates of the cost of producing ore in the Gogebic iron range, royalties must be first considered, for, as before explained, the rule of operation generally includes a compensation from the mining company to the owners of fee, who hold their lands at such figures as to practically prohibit their purchase. The ordinary royalty is 50 cents per ton of ore shipped, but it varies from 30 to 75 cents per ton, and the mining companies are ordinarily obligated to pay for a given quantity of ore whether mined or not. Some of the leases are by no means oppressive, but others must either be altered in the future or they will cripple the companies operating under them. Fortunately most of the leases have clauses which permit of their termination by fair notice from the mining company to the owners. Some mines work upon a sliding scale of royalty, of which one instance may be given. When ore sells at \$5 per ton at Cleveland, the royalty is 7 per cent. of the selling price; when it sells above \$5 and not over \$6, the royalty is 8 per cent., &c., so that \$5 ore pays 35 cents per ton royalty, \$6 ore 45 cents per ton, and \$7 ore 63 cents per ton. This appears to be an equitable lease, but is hampered by the option of the fee owners to elect whether the prices fixed early in the season are to be used as a basis. In one mine, as yet not fairly developed, a high royalty and a large output are guaranteed the fee owners, which, unless the property proves to be much above the average can never be maintained.

In some of the open pit work mining is now cheaply done, but it would be unfair to base an estimate upon these unusual developments. Few of the mines will be operated in open pits except temporarily, and therefore a fair gauge of the cost of mining a ton of ore should be the underground workings. These require timber, pumping, hoisting machinery, light and ventilation. A careful estimate places the cost of underground labor for a series of years (based upon the wages for miners of \$2 per day) at \$1.10 per ton of ore mined. We have therefore:

Underground labor.....	\$1.10
Timbering.....	.10
Surface labor.....	.10
Superintendence and office expenses.....	.17
Fuel, light, supplies, &c.....	.30
Maintenance of machinery and equipment.....	.10
Total.....	\$2.10

In one of the best managed mines the pay roll for all labor above and below ground amounted to \$1.33 per ton of iron ore. To this must be added the cost of timber delivered at the mine, say 20 cents per ton of ore, and explosives, fuel, light, supplies, repairs, superintendence and office expenses, bringing the total close to the above figures. Outside of the open pit work the ore now mined in the Gogebic iron range probably costs from \$2. to \$2.50 per ton. An average being about \$2.20 per ton, to which add royalty, say 50 cents. The present freight to Ashland is 80 cents; if competition reduces this to 60 cents the ore will cost on Ashland docks \$3.30 per ton. Allowing for transportation to Cleveland, dock charges and commission, it is probable that the average of the Gogebic mines can be delivered at Cleveland for \$5 per ton, showing a modest profit at a selling rate of 8 cents per unit of iron in the ore. With augmented prices the profit would be increased.

Some of the mines cannot produce ore at the above figures, nor is it to be expected that all of the mines will be financial successes. The risks of mining will influence the Gogebic iron range, as well as other districts, and mines which now make an excellent showing may depreciate, while others less promising may develop into large producers. However, there is little probability that it will be good policy to operate numerous small mines under independent management, but the consolidation of adjacent properties will result in a material reduction of fixed charges.

The nominal capitalization of the mining companies now operating exceeds \$60,000,000. A profit of 50 cents per ton on an annual output of 6,000,000 tons would be necessary to pay a 5 per cent. dividend. But 6,000,000 tons of such ores would produce nearly three-fourths of all the pig iron made in the United States, and equal a quantity of ore double the greatest output of all of the Lake Superior mines up to 1886, the total product of the Marquette, Menominee, Vermilion and Gogebic districts in 1886 being about 3,500,000 tons.

CONCLUSION.

The Gogebic iron range needs but the truth told of it, and any elaboration beyond actual facts will injure rather than advance its interest. It is a region of remarkable wealth, and has entered the list of

ore producers to stay. Nor is it probable that its wealth is even now known, prospecting east and west demonstrating ore indications. A second range 12 miles south of and nearly parallel to the Gogebic range gives strong magnetic attraction, and parties are now exploring for magnetic iron ores. What the future will develop is beyond surmise, but it does not seem at all improbable that the iron regions tributary to Lake Superior will continue to augment their output, and that new discoveries will make this great region a producer of iron ore second to no other. Within a year a rival in importance to the Gogebic iron range may be discovered, and even now preliminary work is being done on properties far removed from either of the present developed districts.

The Gogebic iron range entered the field at an opportune time. Already fortunes have been made in it and fortunes may still be made. It will have its full share of losses, but the prospects for a stiffening of prices augurs favorably for the immediate future of many of those interested. As a district it will be successful, but whether any particular enterprise will be a success can only be determined in time, although much can be foreseen by a careful study of each property. Some of those interested in booming special properties speak of developments as if a mine to produce 100,000 tons per annum was no uncommon affair, and seem to think that no attention need be paid to other ore-producing districts. They do not realize that the Cornwall Ore Hills in Pennsylvania, right in the midst of blast furnaces and convenient to fuel supplies (the cheapest mining in large amounts in the country), never until 1885 produced over 500,000 tons in one year, and in the last 23 years its aggregate output amounted to about 5,500,000 tons, the total for over 150 years of mining reaching approximately 8,000,000 tons. That although ore was mined in 1845 from the Iron Mountain, Missouri, it only reached an output of 269,480 tons in 1872, and the aggregate of all the ore taken to date from this well-known deposit is about 3,000,000. Pilot Knob, Missouri, first worked in 1847, has produced about one-half as much ore as the Iron Mountain.

Notwithstanding the unprecedented activity in the shipment of Lake Superior ores, but nine mines produced over 100,000 tons each in 1886, four of these being in the Marquette region, two in the Menominee region and two on the Gogebic iron range. The ninth is the Minnesota Iron Company, which have several mines in the Vermillion district in Minnesota, whose product is aggregated in their report. The following are the names of mines and the district in which they are located, placed in the order of their output in 1886:

	Gross tons.
Minnesota Iron Company, Vermillion district.....	304,396
Lake Superior Mine, Marquette district.....	252,493
Colby Mine, Gogebic district.....	220,160
Republic Mine, Marquette district.....	241,162
Cleveland Mine, Marquette district.....	210,304
Chapin Mine, Menominee district.....	195,915
Vulcan Mine, Menominee district.....	143,312
Champion Mine, Marquette district.....	130,955
Norris Mine, Gogebic district.....	110,715
Total.....	1,838,442

Or more than one-half of the aggregate product of the four Lake Superior districts. Mines of 100,000 tons annual capacity will be the exception, not the rule.

The dip of the strata would seem to indicate that the formation had been tilted from a horizontal to nearly a vertical position, and the probabilities, therefore, would favor finding the ore at considerable depths, but as the sinking continues the expense of hoisting, timbering and pumpage increases. Although the iron range is at present an avenue cut through the forests, the demands of the mines for suitable timbering will make heavy inroads upon the trees, and already mine timber of large size is brought 40 to 50 miles by railroad.

Judging from present developments it would appear that the Gogebic iron range has as advantages over the Marquette and Menominee ranges—a better average quality of ore, an apparently more regular formation and consequently greater probability of continuity of the ore body, and the possibility, for the present at least, in a number of cases of cheaper mining. As compared with these older districts the Gogebic iron range has a longer distance to transport its ore by lake and a shorter season of navigation; if the railroad connections as projected are carried out and an outlet at Escanaba or on Green Bay is obtained, the distance from such part or parts will necessitate a longer haul by railroad than from either of the other districts. As compared with the Vermillion district in Minnesota, the Gogebic iron range has a shorter haul by railroad to its present shipping port and also shorter lake transportation.

The activity given to the ore carrying vessels by the large shipments of 1886 caused such advances in freights that the ore producers have apparently convinced the railway companies which connect with their mines that if a fair tariff of charges were established a large tonnage of practically indestructible freight could be secured for winter haul, for it is now reported that all rail rates to Milwaukee and Chicago have been given which will permit of some of the output of the mines being shipped during winter, the rates placing the various districts on a practical equality. If the ores are shipped dry there will probably be little trouble from ice; but the shipment of wet ores in a rigorous climate will lead to serious inconvenience in unloading. If these all rail shipments aggregate any considerable quantity the effect will be noticeable in the prices of the coming season, for the proportion of ore held at the docks of receiving ports is unusually small, and a boom in prices in the spring would react later on and encourage excessive charges for lake carriage. Such a boom would encourage speculation in stocks by admitting of profits being shown which would not be maintained, for but few who would be attracted by the profits made under special conditions would consider it necessary to figure on the average earnings of years; but if their investments did not continue to prove as good as anticipated they would join in condemning the region.

WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., January 4, 1887.

There remain but 50 working days of the session. The coming week will be devoted principally to disposing of appropriation bills, with a view to clearing the decks for action on revenue measures. Chairman Morrison, who has been among his constituents, appears not to have profited by the handwriting on the wall of his political career, or else the results in his district belied the economic ideas of his constituency, as he is more confirmed in his position than ever, and is fuller of fight than when he first came here at the opening of the session. From the present tone of Mr. Morrison's conversation he is not just now disposed to accept any terms of compromise with Mr. Randall, and will make another attempt at his own measure. His friends claim that they have learned something by experience. They claim to be confident that another effort will produce the necessary change of votes to give them a majority for consideration. There was considerable wavering on the last vote, which a little more Administrative pressure might have brought over, and which they claim will be found on their side next time. It was a noticeable fact that two of their gains, making a difference of four votes, were Republicans from Massachusetts and two more were very doubtful. The unexpected bristling up on the part of Colonel Morrison is interpreted to mean something. Mr. Randall during the recess remarked that matters were ominously quiet in the Morrison camp.

The talk of the chairman of the Committee on Ways and Means of repeating his motion to go into Committee of the Whole has started up Randall's friends, and the Republicans now are talking of submitting a bill. From present indications there will be a diversity of propositions on so-called tariff reform—the Morrison Democratic free trade, Randall Democratic incidental protection, and Republican high protection. This will undoubtedly afford scope enough to give everybody a chance to choose for himself, though a poor way to encourage industry by promoting confidence. If the three measures get before the house by way of introduction they will not be likely to get out of Committee on Ways and Means, except upon arrangement to go into committee of the whole, where they will each have a chance.

The project of Mr. Randall to introduce his bill and ask its consideration without reference does not meet with favor among the Republicans. Mr. Reed says that the repeal of excise and change of customs duties affects too many interests to be permitted to come up without careful committee consideration. As Mr. Reed is a Republican member of the Committee on Ways and Means it is probable that his party colleagues will be largely influenced by his suggestions in a parliamentary way. The scheme to reduce internal revenue taxes by a combination of conservative Democrats and Republicans gives Colonel Morrison evident uneasiness. He knows that such a proposition would enlist 80 or 100 Southern Democratic votes and would carry almost a solid Republican support. His friends, in event of the consideration of such a bill, will attempt to amend it by an attempt to place lumber, salt, fish, coal and iron ore on the free list.

RECENT CUSTOMS DECISIONS.

Buckles manufactured of iron, coated with Japan varnish; buckles manufactured of brass and iron, coated with lacquer, and other buckles manufactured of brass alone, are held to be dutiable at the rate of 45 per cent. ad valorem, under the provision, T. I., new, 216, in Schedule C, for "manufactures, articles or wares, * * * composed wholly or in part of iron, * * * or any other metal," &c., such buckles not being comprised within either the provision for "plated or gilt ware" or for "japanned ware."

Old iron car wheels, originally of American manufacture, exported and returned in a condition unfit for use, and serviceable only for the purpose of remanufacture, are not entitled to free entry as domestic manufactures "returned in the same condition as exported," but are dutiable at the rate of 1 cent per pound, under the provision (T. I., new, 145) in Schedule C, for "scrap iron, * * * but nothing shall be deemed scrap iron * * * except waste or refuse iron * * * that has been in actual use and is fit only to be remanufactured."

THE IRON ORE DECISION.

The decision in the case of commercial iron ore deprived of moisture at 212 has not yet been completed. There is some talk of suggesting the adoption of a scale of average moisture with reference to the assessment of duties. It has been discovered that the position taken by the Treasury Department will involve many complications.

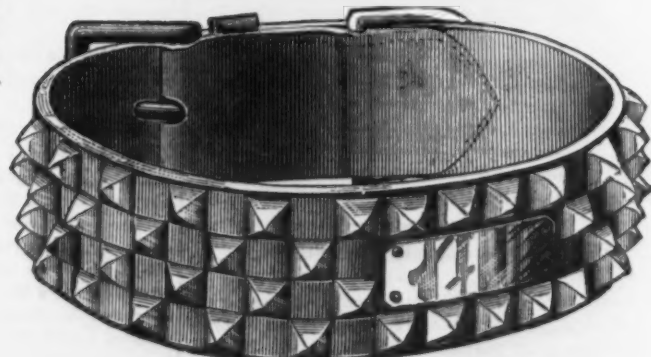
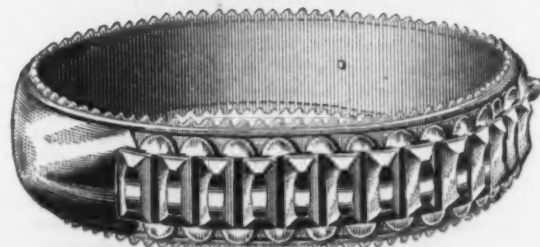
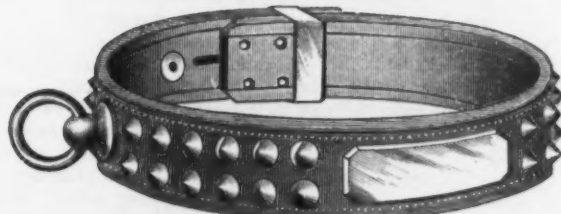
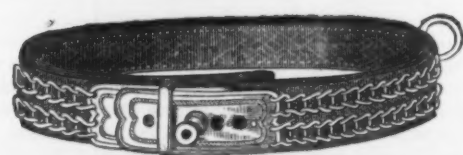
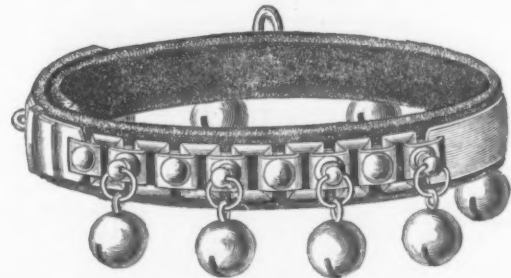
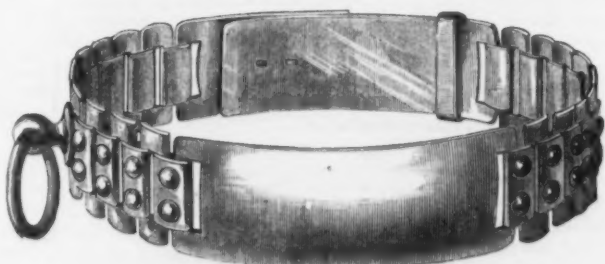
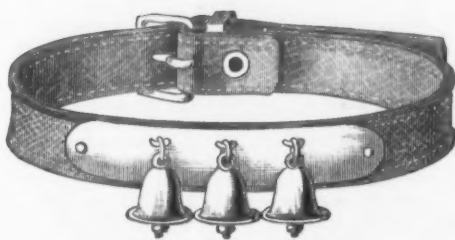
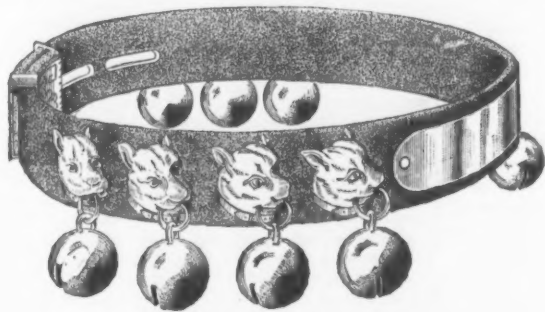
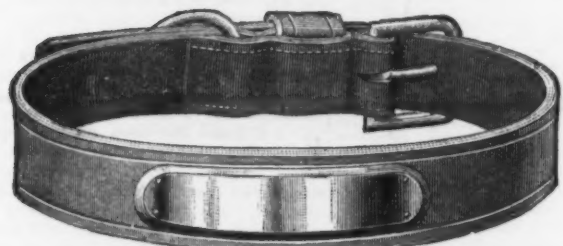
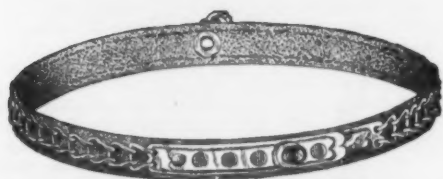
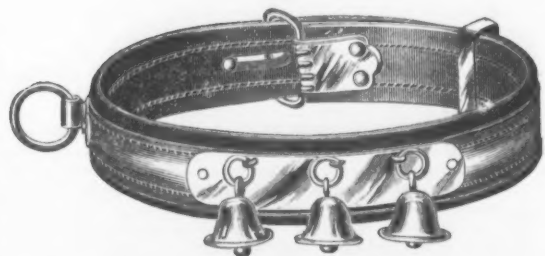
The Electric Road at Scranton.

Of the electric railroad at Scranton, Pa., which is now being successfully operated under practical working conditions a correspondent sends the following particulars: The length of the road is $\frac{3}{4}$ mile. It has four grades, aggregating about $\frac{1}{4}$ mile in length, and being about 300 feet to the mile; two grades aggregating about $\frac{1}{4}$ mile, and being about 4 per cent. The entire road is at different grades nearly its whole length, thus making it one of the most difficult possible. There are now made 37 trips per day, and the quickest time is 9 minutes. The average time is 20 minutes, stopping at 10 street corners en route. The speed is about 12 miles on level and 6 miles on grade. There have been carried on two cars running during the day upward of 2200 people, each car at times carrying 50 to 90 people. The cars are lighted with the incandescent system. The expense is less than horse-power so far. Power has never failed an instant. The cars were built by the Pullman Palace Car Company. This electric system at Scranton began in November, 1886, and since December 1, 1886 has been run regularly and reliably.

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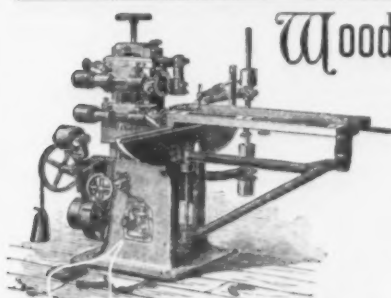


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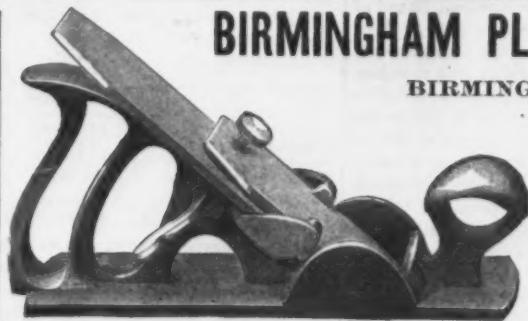
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Trade Report.

as creditors to the extent of their judgments. The decision will be appealed from.

According to the Custom-House report the exports of specie from New York during the week were \$160,516, making a total of \$47,233,890 for the year 1886, against \$24,181,978 for 1885. The imports for the same time were \$5,244,395, making the total for the year \$41,018,549, against \$18,058,912 for 1885.

The net bonded indebtedness of New York city at the beginning of the year was \$93,306,145. The debt of Brooklyn is \$33,624,823.

The new bank examiner for New York is Valentine P. Snyder, successor to Mr. Scriba, whose resignation was requested.

Trade advices from various points generally show that the business of the last few months exceeds that of the corresponding period in 1885. In Boston we are told: "The conditions of trade at the close of the year will compare very favorably with any year on the calendar for a long period. The volume of business has been decidedly heavy for the latter part of the year at least, and this volume of transactions has been of a nature that must of a necessity bring about other movements which it remains for the year 1887 to complete. In business circles the feeling is better than at any time for many months, perhaps even for several years, and one of the best features of this better feeling is that it has come about by degrees rather than in the form of any boom or inflated state of the markets. From the West advices are of a similar tenor."

The clearings of 32 cities last week were decreased 7.6 % compared with the corresponding week last year; outside of New York there was an increase of 5.2 %. For the month of December the clearances amounted to \$5,113,780,818, as against \$4,504,191,063 last year, an increase of 13.5 %. Outside of New York they aggregated \$1,405,307,608, as against \$1,165,797,697 in 1885, an increase of 20.3 %. For the year they were \$48,043,690,041, against \$41,341,153,770 in 1886, an increase of 16.4 %. Outside of New York, \$15,257,366,820, against \$13,188,954,410 in 1885, an increase of 15.7 %. The weekly bank statement was favorable beyond expectations, there being an increase of \$5,039,150 in surplus reserve, which now stands at \$12,271,350. Specie in use \$5,415,100, and deposits increased \$7,506,200; loans without important change. The annual report of Bank Superintendent Paine states that during the fiscal year the increase in the aggregate resources of the banks was \$11,579,775; the increase in loans and discounts during the same period was \$12,611,582 and in deposits \$13,642,634. The increase in surplus and undivided profits was \$1,083,492. Reports from 20 trust, loan, mortgage, security, guarantee or indemnity companies show that the increase during the year in bonds and mortgages was \$1,109,502.37; in stock investments, \$1,202,162.74; and in the amount loaned on collaterals, \$33,690,576.84. The increase in deposits during the same period was \$21,783,367.76. The net increase in assets during the year was \$24,142,926.43.

The imports of merchandise at this port for the last week of the year were \$8,965,059, making the total since January 1 \$434,302,567, against \$396,611,794 for the year 1885. The exports were \$2,468,972 above those for the previous week, the valuation being \$7,141,137, making a total for the year of \$327,292,487. The items include 106,563 barrels flour, 640,613 bushels wheat, 237,677 bushels corn, 21,924 bales cotton, 8,250,010 gallons petroleum, 10,575,947 lb cut meats, 5,919,347 lb lard.

The condition of the finances of the State, as shown by the message of Governor Hill, is gratifying. The debt has been reduced \$134,650. On September 30, 1886, the total funded debt was \$9,327,204; the aggregate sinking fund was \$5,051,073; the debt unprovided for was \$4,276,131.

Coal Market.

A serious crisis in the Coal trade is precipitated by a strike of Coal handlers at all the seven shipping ports—Perth Amboy, South Amboy, Weehawken, Hoboken, Port Johnson, Newburg and Elizabethport. The strikers demand an advance of 2½¢ an hour, and are supported by District Assembly 49, of the Knights of Labor. No overtures for an adjustment have been made on either side, and a stubborn conflict is promised. Meanwhile business in New York is completely suspended; there are no prices, and no orders can be taken. Fortunately retail yards have generally laid in a good supply, but there are many manufacturers who will be seriously embarrassed if fresh supplies are long withheld. About 2500 men are idle. The total amount of Anthracite mined in the year 1886 is 32,086,146 tons, compared with 31,510,291 tons last year, an increase of 575,855 tons.

Pittsburgh has 857 puddling furnaces, all of which are running night and day excepting 13, producing daily 1800 tons of muck iron. Seventeen new furnaces have recently been built, and 43 more are building.

NEW YORK.

American Pig.—The market has been quiet, but is very firm. Sellers have booked so heavily that the majority of them are out of the market. On the other hand, the great number of consumers, large and small, have covered requirements for some time to come. There is little doubt but that considerable lots of Foundry Irons could be easily placed at the figures at which the contract sales were recently made. In some instances buyers ask for delivery during the whole of the year, while sellers decline to enter orders beyond the early summer. For small lots urgently wanted, it is reported that \$21.50 @ \$22 has been paid, and it would probably be difficult to place them, much, if any, below \$21. But for larger lots to regular customers, some furnace companies are still willing to quote \$20 for No. 1 Foundry. For No. 2 the market is \$19 @ \$20, while Forge is in an uncertain position. The heavy advance in the West is reflected in higher prices at Lehigh and Schuylkill Valley furnaces, but those furnaces in New York and New Jersey, whose market is more limited, have not yet followed the upward tendency, and we quote \$17 @ \$18.

Scotch Pig.—The market is quiet and firm. There are indications that sensational dispatches to Glasgow from this side are used to create an excitement there. We quote: Coltness, \$22 @ \$22.50 to arrive; Shotts and Langloan, \$21.50 @ \$22; Summerlee, \$21.50 to arrive; Dalmellington, \$20 @ \$20.50; Clyde, \$20 @ \$20.50, and Eglinton, \$19.50 @ \$20.

Bessemer Pig.—The market is quiet, no business being reported in Foreign Iron, which we quote, nominally, \$20.50 @ \$20.75 for ordinary grades. Domestic is \$18.50 @ \$19.50 at furnace.

Spiegel Eisen.—We hear of no transactions. We quote \$28.25 @ \$28.50 for 20 % \$32.25 @ \$32.50 for 30 % and \$23 for 10 % to 12 %.

Bar Iron.—The market is strong, with a fair amount of business doing. Freight from Pittsburgh have been advanced from 15¢ to 18¢ per 100 lb. We quote: Common, 1.75¢ @ 1.80¢; Medium, 1.80¢ @ 1.90¢, and Refined, 1.95¢ @ 2.15¢, for round lots on dock.

Structural Iron.—A good deal of business is in sight, and there is every prospect of employment up to full capacity for the current year. We quote according to quality, for Angles, 2.25¢ @ 2.50¢, delivered, and Tees at 2.75¢ @ 2.9¢, for round lots. Steel Angles are quoted 2.40¢ @ 2.60¢, according to quality. Store quotations remain 2.60¢ @ 2.75¢ for Angles and 2.9¢ @ 3¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders.

Plates.—The mills are very fully employed, and only a few can take February delivery. The tendency is strongly upward. We quote for round lots: Common or Tank, 2.45¢ @ 2.6¢; Refined, 2.50¢ @ 2.60¢; Shell, 2.7¢ @ 2.8¢; Flange, 3.70¢ @ 3.8¢; Flange, Extra, 4¼¢ @ 4½¢. For small lots of Steel Plates the quotations are as follows: Tank, 2.90¢ @ 3¢; Ship, 3¢; Shell, 3¼¢ @ 3.50¢; Flange, 3.50¢ @ 3.75¢, and Fire-Box, 4¼¢ @ 4½¢, on dock.

Merchant Steel.—The demand is not quite so brisk as it has been, the business during the last four months of 1886 having been, according to good authority, fully 25 % greater in volume than for the corresponding period in 1885. We quote nominally for the range of ordinary to good grades as follows: American Tool Steels, 7½¢ @ 9¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; English Tool, 13¢ @ 15½¢; common grades, 7¢ @ 9¢; Crucible Machinery, 3.75¢ @ 4.50¢. The Steel Association, which held highly attended meetings in this city this week, quote base prices for larger lots: Open-Hearth and Bessemer Machinery, 2.7¢; Spring, 2.7¢; Round-Edge Tire, 2.5¢; Square-Edge Tire, 2.7¢; Toe Calk, 2.6¢; Sleigh Shoe, 2.4¢. Open-Hearth and Bessemer Cutlery is quoted 3.2¢; Fork, 3.2¢; Rake, 3.5¢; Hoe, 2.7¢; Screw-Driver, 4.2¢; Auger Bit, 3.5¢, and Plow Slabs, 2.5¢.

Billets and Slabs.—The market has stiffened, the last sale, a lot of 4000 tons, having been made at \$31.50, buyers taking risk of duty. There are a number of inquiries in the market. Slabs are scarce and higher, \$32.50 having been paid for a small lot.

Wire Rods.—The market has stiffened considerably, and a number of sales of moderate-sized lots have been made during the past two weeks at \$40, \$40.50 and even \$41. There is more inquiry, among the lots asked for being one of 5000 tons. We quote \$40.50 @ \$41.50, according to quantity and time of delivery.

Steel Rails.—There has been little business during the week, the majority of the mills being unable to quote. There are reports of sales at high prices, but Rails are still offered by occasional mills at \$36.50 @ \$37 at mill for March and April delivery in moderate lots. The tendency is upward.

Rail Blooms.—We hear of a sale of a round lot of Domestic Blooms at \$30.50 at Eastern mill. Foreign are higher. There is an inquiry for 20,000 tons in the market.

Old Rails.—The market has taken another upward start. We note sales of 3000 tons of Double Heads for shipment to New York at \$26, and a similar price for

2000 tons of Bridge Rails for shipment; also one lot of 1000 tons T's at \$24.50, and a second lot of 500 tons at the same price under special circumstances. Two hundred tons of Double Heads and Bridges were sold at \$25.50, steamer arrival, and \$25 was paid for a 100 lot of T's. In New England a lot of nearly 1000 tons of American T's was sold at \$30 at mill, equivalent to \$29 at Boston. Some holders are now asking \$26 for T's, and \$28 was offered for a 5000 ton block at Pittsburgh. There are large negotiations pending, \$25.25 being asked for T's for a 5000-ton lot of Foreign, early shipment.

Seran.—The market is much stronger, \$23.50 and \$23.75 having been paid for small lots of Foreign shipment, while \$25 was realized for a 200-ton lot of Domestic at Perth Amboy, and \$24 for a lot from store. For a 500-ton lot ex-ship \$24 has been offered.

Rail Fastenings.—We quote Spikes 2.25¢ @ 2.50¢, delivery New York. Angle Fish Bars may be quoted 2.10¢ @ 2.20¢. Bolts and Square Nuts are 3¢ @ 3.10¢, and Bolts and Hexagon Nuts 3.20¢ @ 3.25¢.

Philadelphia.

Office of The Iron Age, 280 South Fourth St., PHILADELPHIA, January 4, 1887.

Pig Iron.—Business has hardly commenced yet, so that it is difficult to say what the exact condition of the market is. All the indications point to higher prices, however, as there is scarcely anything available at last week's quotations. Some quote about \$21 at tide for No. 1 Foundry, and \$18 for Gray Forge, but in doing so are careful to say they are sold close up, and can spare only very little at present. Evidently the disposition is to take a fresh review of the position, and to make prices accordingly. If predictions may be ventured upon, quotations will be very likely to start in at from \$21 to \$22 for No. 1 Foundry, \$19.50 @ \$20 for No. 2, and \$18 @ \$18.50 for Gray Forge. These figures are high enough under present conditions, and may be the limit for some time to come, although the position is such as to admit of rapid changes, providing there are any new developments to give it a start. Meantime it is understood that consumers have provided themselves with pretty much all they are likely to require for some time to come, so that under ordinary circumstances a steady and quiet market is about all that can be fairly expected. Consumption is steadily increasing, and while there is good reason to expect its continuance, it is equally certain that the output is increasing, and in this way supply and demand may be pretty equally balanced. The market is in a very sensitive condition, however, and the question is not so much—will the market go higher? but how much higher?

Foreign Iron.—Markets abroad are very unsettled, and on the whole higher. It is difficult to determine how much of the firmness is a reflection of our own markets, but they are evidently on the lookout for a big American demand. Bessemer Pig is quoted at from \$20.75 to \$21, although slight concessions might perhaps be had on firm offers for good-sized lots. Spiegel Eisen is nominally about \$28.50 for 20 %, but no transactions have been reported recently.

Blooms.—Steel Blooms of all kinds are dearer. It is difficult to give exact quotations, particularly on Foreign Blooms, as a great deal depends on terms of sale. Some quote \$30 c.i.f. duty paid on Rail Blooms, and \$31 @ \$31.50 on Nail Slabs, but these figures could be made to look much lower if the buyer would take them f.o.b. furnishing banker's credit, &c. The tendency is toward higher figures, however, with the following as to-day's asking figures: Rail Blooms at \$30, c.i.f. duty paid; Nail Slabs, \$31 @ \$31.50; Sheet-Iron Billets, \$33 @ \$34; higher qualities for Boiler Plate, &c., \$36 @ \$40. American Blooms are as follows: Charcoal Blooms, \$55 @ \$56; Runout Anthracite, \$45 @ \$46; Scrap Blooms, \$36, and Ore Blooms, \$35 @ \$35.50.

Muck Bars.—The demand is increasing and prices are again higher. Sales, \$33 @ \$33.50 at mill; some hold for still higher figures.

Bar Iron.—As may be supposed, business has been very quiet during the past week or 10 days, and there is really very little to report at this time. The feeling is very firm, however, and as the mills are supplied with orders sufficient to carry them well into next month they are not disposed to enter more unless at full market rates. Skelp Iron is bringing more money, and will be likely to affect values along the entire line, as the demand shows no abatement whatever. Sales in 1000-ton lots of grooved Skelp at 2.2¢, with bids of 2.15¢ for several thousand tons more, sellers asking 2.25¢. Best Refined Bars, 2¢ @ 2.1¢; Medium quality, 1.85¢ @ 1.9¢.

Plate and Tank Iron.—No great amount of business has been done lately, but there is no scarcity of buyers at a shade under quoted rates. Meanwhile the mills have plenty of work on hand, and are unwilling to take more unless at full market prices. The feeling as yet is somewhat uncertain in tone, and may require several days to bring settled quotations, but the indications are somewhat in sellers' favor. Sales at about the following quotations: Ordinary Plate, 2.40¢ @ 2.45¢, delivered; Tank, 2.45¢ @ 2.50¢; Shell, 2.7¢ @ 2.75¢; Flange, 3.5¢;

Fire-Box, 4.25¢; Steel Plates, Shell, 3.25¢; Flange, 3.5¢; Fire-Box, 4¼¢ @ 5¢.

Structural Iron.—The outlook in this department is very encouraging, and mills are all crowded with work. Nothing of special importance has been entered within the past week or two, but there is plenty of business in sight. Prices slightly higher, as follows: 2.4¢ @ 2.5¢ for Bridge Plate; 2.25¢ for Angles; 2.7¢ @ 2.8¢ for Tees, and 3¢ for Beams and Channels.

Sheet Iron.—The demand is only moderate for Thin Sheets, but other descriptions are wanted at full quoted rates. Prices about as follows:

Best Refined, Nos. 26, 27 and 28..... 34¢
Best Refined, Nos. 18 to 25..... 31¢
Common, 14¢ less than the above.
Best Bloom Sheets, Nos. 26 to 28..... 44¢ @ 5¢
Best Bloom Sheets, Nos. 23 to 25..... 44¢ @ 46¢
Best Bloom Sheets, Nos. 18 to 21..... 39¢ @ 4¢
Blue Annealed..... 2.70¢
Best Bloom, Galvanized, discount..... 57½¢
Common, discount..... 63½¢

Steel Rails.—There is a good deal of inquiry for Rails, but mills are so full of orders and prices so feverish that only a moderate amount of business has been actually closed.

Reports say that \$39 has been paid at some of the Eastern mills, but about \$38 is the usual quotation, although it is by no means certain that the mills are in a position to accept orders, so that quotations in such cases do not have much weight. Probably \$37.50 @ \$38.50, at mill, covers both extremes of the market, with a very firm feeling among holders.

Old Rails.—The market is somewhat quiet, and has not fully recovered from the dullness incidental to the holidays. Prices are firm, however, with \$25.25 asked for shipments of T's and \$26 for Bridges. Sales this week at \$25 for T's and \$25.75 for Bridges.

Scrap Iron.—There is a good demand, and sales are freely made at the rates quoted herewith: No. 1 Wrought Scrap, tidewater delivery, \$23.50 @ \$24; Selected do., \$24.50 @ \$25.50; No. 2 do., \$15 @ \$16.50; Turnings, \$14 @ \$14.50; Old Car Wheels, \$17 @ \$17.50; Old Steel Rails, \$21 @ \$22; Cast Scrap, \$15 @ \$16; do. Turnings, \$10 @ \$10.50. Old Fish Plates, \$28 sales.

Wrought-Iron Pipe.—Business in this department is rather quiet, but prices are held very firm. Discounts are as follows: Butt-Welded Black and Galvanized have advanced 2½¢ respectively. Discounts are as follows: Lap-Welded Black, 52½¢; Butt-Welded Black, 35¢; Butt-Welded Galvanized, 25¢; Lap-Welded Galvanized, 35¢; Boiler Tubes, 45¢.

Nails.—A fair amount of business is being transacted; any number of inquiries are received for Nails at the old price, but holders refuse to sell for less than \$2.25 from store. An advance in price is looked for, if not, the only available resort will be a stoppage of mills for some time.

Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., January 4, 1887.

The general Iron and Steel business has been comparatively quiet during the week, as might be expected. So far as this district is concerned the Iron business never was in a more healthy condition; there is an absence of speculation, and a most encouraging feature is the fact that prices have advanced to such an extent that speculators would be afraid to buy at present prices. The danger most dreaded is that of importations; it is feared that if prices are run up much higher that large quantities of foreign material will come in. The business of the last half of 1886 was the largest probably in the history of the country. Never before were the furnaces so well sold up; some of them have contracts made sufficient to absorb their production from two to four months ahead, and quite a number of the mills are in the same condition.

Pig Iron.—While there has not been as much business the past week, and no further advance in prices, it looks as if the market had settled down; this has been looked for by some of the more conservative operators for some time past, and they were a good deal surprised that it did not come sooner. However, there is no evidence whatever of a relapse; on the contrary, the market is in a strong and healthy condition, and the falling off in business is owing chiefly to an absence of iron to sell, as the furnaces are all sold ahead from one to four months, and are indifferent about making additional contracts. As compared with the 1st of January, 1886, prices on all grades of Mill Iron are about \$4 per ton higher; Bessemer has advanced \$3.50 @ \$4 per ton, as compared with the lowest; Foundry Irons have also advanced considerably, but they have not kept pace with the advance in Mill Irons. The Pig Iron trade never was in much, if any, better condition than it is at present, while production is larger than ever before. The same is true of consumption, and the visible supply is steadily being reduced. Quotations may be fairly given as follows:

No. 1 Gray Forge..... \$30.50 @ \$31.00, 4 mos.
No. 2 Gray Forge..... 19.00 @ 19.50, 4 "
All-Ord Mill..... 21.00 @ 21.50, 4 "
No. 1 Foundry..... 21.50 @ 22.00, 4 "
No. 2 Foundry..... 20.80 @ 21.00, 4 "
No. 3 Foundry..... 22.00 @ 22.50, 4 "
Charcoal Foundry..... 19.00 @ 19.50, 4 "
Cold-Blast Charcoal..... 27.00 @ 30.00, 4 "
Bessemer Iron..... 21.50 @ 22.00, 4 "

Included in the sales was a round lot of Bessemer at \$21.50 cash; several lots of

Gray Forge at \$20 cash, and \$20.50 for four months; it was reported that a round lot of the latter had been sold at \$21 four months.

Muck Bar.—Continues in an unsettled condition; and with buyers and sellers wide apart in their views, it is difficult to give reliable quotations. While we are not advised of any sales having been made above \$33.75 @ \$34 cash, some sellers are asking from \$35 to \$36 cash, and refusing to accept less. There is but little offering, as nearly all the mills making it for sale are sold ahead and are indifferent about making additional contracts.

Manufactured Iron.—There is, as might be expected, a falling off in business. One reason of the very active demand during both November and December was the anxiety of both jobbers and consumers to anticipate future wants in view of the steady advance in prices. We now quote on a basis of 2¢ @ 2.10¢ for Bars, 60 days, 2 ½¢ off for cash, showing an advance of 1½¢ @ 1½¢ per lb, as compared with the lowest point.

Nails.—There is but little change to note in the general position of the Nail trade; business continues light, and there will not likely be any substantial improvement until the spring trade opens up. Prices are firmer, but unchanged; Iron Nails, \$2.10, 60 days, 2 ½¢ off for cash, and Steel do. 10¢ per keg additional. The demand here is chiefly for the former, while out West it is almost entirely for the latter. The price fixed at the last meeting of the Western Association is not being maintained here, because it cannot be done, as Eastern manufacturers are selling in Western markets considerably below the price quoted, and Western makers have to meet the cut or lose their trade. It is thought Eastern manufacturers will be obliged to stiffen up before long, in view of the enhanced cost of raw material there as elsewhere.

Wrought-Iron Pipe.—The demand for Pipe has fallen off somewhat as compared with what it was a month or more ago, but most of the mills are still pretty well employed working up former contracts. Prices remain unchanged. Discounts on Black Butt-Welded Pipe, in carlots, 37½¢; Galvanized do., 27½¢; Black Lap Welded, 55¢; Galvanized do., 27½¢; Boiler Tubes, 45¢; Casing, all sizes, 47½¢; 2-inch Tubing, 16¢ per foot net; 2-inch Line Pipe, 14¢; 8-inch Drive Pipe, \$1.40.

Old Rails.—There have been but few sales reported during the past week, large consumers appear to be pretty well stocked, and they are not disposed to buy at present prices. English Double Heads would cost \$29 @ \$29.50 laid down in Pittsburgh, and Tees about \$1 less. Very few American Rails offering. The feeling begins to obtain that possibly the market has about touched the highest point, and just as soon as there is ground for believing that such is the case there will at once be a falling off in the demand.

Blooms, Billets, &c.—Bessemer Billets and Blooms continue very scarce, as the mills making them are all sold ahead. We continue to quote at \$34 @ \$35 cash; Foreign cannot now be put here under \$33, and consumers generally prefer paying \$1 more for the former. Steel Nail Slabs are still quoted at \$33 cash, at which the last sale reported was made. It may appear strange that Steel Nail Slabs are not worth as much as Iron Muck Bar, but such is the fact. Rail Ends, in the absence of sales, \$24.50 @ \$25.

Railway Track Supplies.—Prices for everything in this line are higher, and the demand is reported better than usual at this season of the year. Spikes, 2¢ @ 2.10¢; Track Bolts, 3.10¢ with Square and 3.20¢ with Hexagon Nuts.

Steel Rails.—There have been no sales reported recently, and it is difficult to give reliable quotations. It is doubtful, however, whether orders would be taken below \$38 cash at mill.

Old Material.—There is a continued good demand, and prices are firm as quoted: No. 1 Wrought Scrap at \$21.50 @ \$22.50, net ton; Wrought Turnings, \$16 @ \$17; Old Car Axles, \$26 @ \$27; Cast Scrap, \$17 @ \$17.50 gross ton; Old Car Wheels cannot be laid down here under \$22 @ \$22.50, gross; Crucible Scrap Steel, \$25 @ \$26; Open-Hearth Scrap Steel, \$22 @ \$23.

Coke.—Blast Furnace Coke unchanged at \$1.50 per ton, cars at ovens. Rumors obtain that an advance is contemplated soon by the syndicate.

Chicago.

Office of The Iron Age, 36 and 38 Clark St., Cor. Lake St., CHICAGO, January 5, 1887.

Hardware.—Trade during the past week was similar to that of the week previous, all business of any importance having subsided consequent upon the holiday season and the closing of the year's trade. Jobbers are giving their exclusive attention to balancing up the year's accounts, and making preparations for the new year's trade. A great many changes in prices are anticipated, and circulars withdrawing former price-lists and quotations are being received from manufacturers of nearly all classes of goods. Changes are announced on Tin and Stamped Ware and Brass Goods, and an advance of 10¢ has taken place on Carriage and Wagon Hardware. Heavy Hardware and Wood Stocks are in good request.

It is difficult to realize at a glance the vast financial and industrial significance pertaining to the construction of more than 8,000 miles of main line railway in this country in a single year. Assuming the average cost to have been only \$20,000 per mile it means an expenditure for roadway alone of \$160,000,000. Add to this the enormous and unknown amount expended for equipment and the still larger amount expended for wages, fuel, and the other expenses of operating this mileage, and it will be seen that the money results of track-laying in a single year run up to almost incredible figures.

Trade Report.

General Hardware.

During the past week only a limited amount of business has been done, as is usual at the opening of the year. There have been comparatively few changes in price, those which have occurred being in the direction of higher quotations. A firm feeling characterizes the market, which is generally regarded as in a more healthful and promising condition than for several years.

BARB WIRE.

The New York market has been more active, and is stronger. A number of buyers who have only recently resisted the late advance have been taking hold and making purchases of round lots up to March delivery, at 4 cents for Four-Point Galvanized Barb Wire, in carload lots. Plain Wire is very firm, the lowest figures named for Smooth being 2.50 cents for 100-ton lots, and 3.50 cents for Galvanized, with few sellers at these figures. Imported Wire Rods have also advanced from their lowest point, \$35 in summer to \$40.50 and \$41 now.

NAILS.

The New York market has been fairly active and stronger, \$2.15 for carload lots of Iron Nails being shaded only in exceptional instances for large lots, spot cash. The tendency is upward, raw materials having further advanced. We quote \$2.25 from store for Iron, and \$2.40 for Steel Nails.

LOCKS.

The conferences between the manufacturers of Locks, concerning which we have kept the trade advised, have resulted in the adoption of a new list, the discount being 60 per cent, with an additional 2 per cent. for cash. That our readers may form an intelligent idea of the change in price, we give in another column a comparative table of some of the leading goods. From this it will be seen that the price has not been evenly advanced, the increased price of the goods being considerably more on some than others, while in a few instances a reduction has been made. In this comparison the new list is taken at discount 60 per cent, and the old list at discount 45 per cent, and 10 per cent., which perhaps fairly represents the market prices which have recently prevailed. In taking this united action the impression is given that the new prices will be more rigidly maintained than were the old, and in order to aid in doing this a change has been made in the system of discounts, the prices for quantity being withdrawn. The plan which has been adopted it is hoped will result in giving greater regularity to prices than has characterized them for some time.

HENRY DISTON & SONS,

Philadelphia, announce the following revised factory discounts for the season commencing January 1, 1887, and express the hope that they may have the co-operation of the trade in maintaining them:

Pages.	Dis. per cent.
8 to 21, Circular Saws and Repairs.....	45
22, Mill and Mulay Saws.....	45
23, Gang Saws.....	45
24, Tilters and Boxes for Pit Saws.....	45
25, Pit, Whip and Furtok Saws.....	45
26, Ice Saws.....	45
27, Butting or Drag Saws.....	45
28-29, Cross-Cut Saws.....	45
30-31, One Man Cross-Cut Saws.....	45
32, Gauge for Regulating Teeth.....	45
33-34, Saw Handles.....	45
35-36, Saw Mandrels.....	45
37, Gummer Cutters.....	45
38, Cutter Grinders.....	45
39, Borthwick's Gummer.....	45
40-41, Swages.....	45
42-43, Saw Sets.....	45
44, Side File.....	45
45, Saw Sets.....	45
46, Saw Clamps.....	45
47, German Pattern Webs.....	45
48, Hand Saws.....	45
49, Doctor Blades.....	45
50, Scroll Saws.....	45
51-54, Hand Saws, all kinds.....	45
55, Cabinet Scrapers.....	45
56-57, Saws, all kinds.....	45
58, Web and Wood Saw Frames.....	45
59, Wood Saw Bucks.....	45
60, Saw Rods.....	45
61, Butcher and Hack Saws.....	45
62, Butcher Saw Handles.....	45
63, Plastering and Pointing Trowels.....	45
64-65, Cane Knives.....	45
66, Post Hole Digger.....	45
67, Pruning Hook and Saw.....	45
68-69, Molders' Tools.....	45
70-71, Brick and Pointing Trowels.....	45
72, Saw Handles.....	45
73, Saw Screws.....	45
74-75, Machinists' Tools.....	45
76, Slat and Crout Cutters.....	45
77-78, Barker's Butts.....	45
79-80, Machinists' and Carpenters' Try Squares and Bevels.....	45
81-82, Try Squares and Bevels.....	45
83, Gauges.....	45
84-85, Screw Drivers.....	45
86, Level.....	45
87-88, Plumbs and Levels.....	45
89-90, Level Glasses.....	45
91, Trammel Points.....	45
92, Superfine Files.....	45
93, "Vautier" Tools.....	45
94-115, Files and Raps.....	45

THE STANLEY RULE AND LEVEL COMPANY, New Britain and New York, publish the following discount sheet, under date of January 1, 1887, to apply to their price list of 1884. It is subject to the usual cash discount of 10 per cent. for cash in 30 days:

	Discount per cent.
Awl Hafts	45
Awls, Patent Pegging	45
Beader, Stanley's Universal	30
Bevels, Sliding T	60
Bevels, Patent Flush Sawks	30
Bit and Square Level	30
Box Scraper, Adjustable	30
Brad Awls, Handled	30
Clapboard Marker	30

Chalk-Lines, Reels and Awls.....	30
Carpenters' Tool Handles.....	30
Cattle Ties.....	30
Countersinks, Wheeler's Patent.....	30
Dado, Filletster, Plow, &c., combined.....	30
Dado, Adjustable.....	30
Gauges.....	30
Gauges, with Improved Face-Plate.....	30
Hand Bender, Stanley's.....	30
Handles, Brad Awl.....	30
Handles, Plane.....	30
Handles, Saw.....	30
Handles, Screw Driver.....	30
Hammers, Magnetic.....	30
Hammers, Tack, No. 4.....	30
Hammers, Upholsterers.....	30
Hollows and Rounds, for Plane No. 45.....	30
Level Glasses.....	30
Mallets, Hickory.....	30
Mallets, Lignumvite.....	30
Mitre Box, Improved.....	30
Mitre Squares, Improved.....	30
Mitre Try Squares, Improved.....	30
Plumbs and Levels, Non-Adjustable.....	30
Plumbs and Levels, Patent Adjustable.....	30
Plumb's and Levels, Nicholson's Patent.....	30
Plumb's and Levels, Iron Frame.....	30
Plumb's and Levels, Machine's.....	30
Pocket Levels.....	30
Planes, Bailey's Adjustable, Iron.....	30
Planes, Bailey's Adjustable, Wood.....	30
Planes, Stanley's Adjustable, Iron.....	30
Planes, Stanley's Adjustable, Wood.....	30
Planes, Stanley's Adjustable, Block.....	30
Planes, Stanley's Adjustable, Scraper.....	30
Plane Irons, Bailey's and Stanley's.....	30
Planes, Bending.....	30
Planes, Chamfer.....	30
Planes, Floor.....	30
Planes, Rabbit.....	30
Planes, Rabbit and Filletster.....	30
Planes, Router.....	30
Planes, Tonguing and Grooving.....	30
Planes, Victor Adjustable.....	30
Plow, Beading Tool, &c., combined.....	30
Plow, Filletster, &c., combined.....	30
Plow and Matching Plane, Bull-Nose.....	30
Plumb Bobs, Adjustable.....	30
Rules, Boxwood, Stanley's.....	30
Rules, Ivory, Stanley's.....	30
Rules, Ivory, Stearns.....	30
Rules, Miscellaneous, Stanley's.....	30
Sash Cord Irons.....	30
Scratch Awls Handled.....	30
Screw Drivers, 1 Varished Handles.....	30
Patent Improved Black Handles.....	30
Screw Drivers, Stanley (56), same list, p. 31.....	30
Spoke Shaves, Bailey's.....	30
Spoke Shave Cutters, Bailey's.....	30
Trammel Points.....	30
Tool Handles and Tools, Excelsior.....	30
Try Squares.....	30
Try Squares, Adjustable Iron Handle.....	30
Try Squares, Improved Iron Handle.....	30
Try Squares, Inlaid.....	30
Try Squares, Plumb and Level.....	30
Try Square and Bevel, combination.....	30
Try and Miter Square, Winterbottom's.....	30
Veneer Scrapers.....	30

In a note appended to their new condensed price list they serve the convenience of buyers by giving the following list of new tools, which are more fully described in their appropriate places on additional pages for their catalogue, which are also issued. The discounts are given above:

Stanley's Patent Bit and Square Level.....	30
No. 44, Bit and Square Level, Brass Frame, per doz.....	\$9.60
Stanley's Adjustable Clapboard Marker.....	30
No. 58, Iron Stock, with Wood Handle, Steel Blade, each.....	\$0.50
Stanley's Universal Hand Bender.....	30
No. 66, Iron Stock, with seven Steel Cutters, embracing six ordinary sizes of Beads, four sets of Reeds, two Fluters and a Double Router Iron.....	\$1.00
Carriage Makers' Rabbit Plane.....	30
No. 104, Carriage Makers' Rabbit Plane, 9 in., 2 1/2 in. Cutter.....	\$8.75
Stanley's Bull-Nose Plow, Filletster and Matching Plane.....	30
No. 141, Iron Stock and Fence.....	\$7.00
Stanley's Bull-Nose Plow and Matching Plane.....	30
No. 143, Iron Stock and Fence.....	5.00
Stanley's Face-Plate Gauges.....	30
Marking Gauges.....	Per doz.
No. 161, Beechwood, Boxwood Thumb Screw.....	\$2.00
No. 162, Beechwood, Boxwood Thumb Screw, Adjusting Steel Point.....	3.00
No. 164, Beechwood, Boxwood Thumb Screw, Plated Head Adjusting Steel Point.....	3.75
No. 165, Boxwood, Brass Thumb Screw and Shoe, Plated Head, Adjusting Steel Point.....	6.00
No. 166, Rosewood, Brass Thumb Screw and Shoe, Oval Plated Head, Adjusting Steel point.....	7.00
Mortise Gauges.....	30
No. 172, Double Gauge (Marking and Mortise).....	\$5.00
No. 173, Boxwood, Brass Slide, Plated Head, Brass Thumb Screw and Shoe.....	9.00
No. 177, Rosewood, Screw Slide, Plated Head, Brass Thumb Screw and Shoe.....	11.00

MISCELLANEOUS PRICES.
The Shepard Hardware Company, Buffalo, N. Y., issue, December 30, an announcement to their customers that, owing to a considerable advance in the price of raw material, they withdraw previous quotations, and for the present will execute orders sent them at prices prevailing at the date of shipment.

The Yale & Towne Mfg. Company, Stamford, Conn., and 62 Reade street, New York, announce that on and after January 1 the trade discount on Yale and Standard Locks—4 e., all goods in their No. 10 list up to and including page 236, will be 33 1/2 per cent. instead of 40 per cent, as heretofore. Discounts on their other goods are unchanged.

A revised list of cordage is issued under date of January 3, in which it will be perceived that an advance is made in the price of Sisal Rope, Manila remaining unchanged. This advance, it will be seen from the list printed below, is of only 1/4 cent, which brings, however, within 2 cents of the price of Manila, thus still further diminishing the usual difference between the two. The revised list is as follows:

Manilla Cordage.	Cts. per lb.
1 1/2 inch cir. and upward; and Hay Rope.....	13 1/2
12 thread, or 1/4 inch diameter.....	13 1/2
6 and 9 thread, or 1/4 and 5-16 inch diameter.....	14
Bolt Rope Yarns.....	14 1/2
Whale Line.....	15
Tarred.....	12 1/2
Sisal Cordage	Cts. per lb.
1 1/2 inch cir. and upward; and Hay Rope.....	11 1/2
12 thread, or 1/4 inch diameter.....	11 1/2
6 and 9 thread, or 1/4 and 5-16 inch diameter.....	12 1/2
Tarred.....	10 1/2
Russia Hemp.	Cts. per lb.
Tarred Cordage, Ratline, Seizing and Worming.....	12
American Hemp.	Cts. per lb.
Tarred Cordage, Ratline, Seizing and Worming.....	12
Jute.	Cts. per lb.
Rope, 1/4 inch diameter and upward.....	8 1/2
Rope, 1/8 and 7-32 diameter.....	8
Cords and Lines.....	8
Packing.....	8
Wool Twine.....	8

Robert B. Hugonin, Hartford, Conn., announces a general reduction in the prices of his Improved Adjustable Screw Sash Balances, which went into effect January 1.

Announcement is made, January 3, of the following revised prices for Lead Pipe, Sheet Lead, &c.:

Lead Pipe.	Cts. per lb.	Tin Lined Lead Pipe.	Cts. per lb.
Sheet Lead.....	7 1/2	Pipe.....	15
		Block Tin Pipe.....	40

An advance in Coes' Wrenches is to-day announced as per the following circular:

New York, January 5, 1887.

We are instructed to advance prices from this date for Coes' Genuine Screw Wrenches of either make, to 55 per cent. discount from list. "Mechanics'" Wrenches, made by L. Coes & Co., and similar quality by A. G. Coes & Co., will continue to rate at 10 per cent. less than the "Genuine." A special discount of 10 per cent. will be allowed on specified orders for 50 dozen for immediate shipment. Terms, 90 days, or 3 per cent. discount for cash in 10 days. Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during balance of season ending June 30, 1887. Above quantity must be taken from either one or the other manufacturer, and includes only the Coes Genuine Pattern or L. Coes & Co.'s Knife Handle, and not the Mechanics made by L. Coes & Co., or a similar quality made by A. G. Coes & Co., the price of either being 10 per cent. less than the Genuine, and are subject to the same quantity schedule. J. C. McCARTY & Co., Agents for L. Coes & Co. and A. G. Coes & Co.

An advance of 10 per cent. has been made in the Hardware list of Brass Cocks, the discount now being 55 and 2 per cent.

The list of Porcelain Head Picture Nails has been advanced from \$2.40 to \$2.80, and the discount made 40 per cent. instead of 40 and 10 per cent.

ITEMS.

Our readers cannot fail to observe the striking double-page announcement made on pages 18 and 19 by the A. F. Pike Mfg. Company, Pike Station, N. H. They advise us that they are offering Scythe Stones at \$1.50 per gross, and Grindstones at \$6.50 per ton, and also call attention to the fact that they now own over 700 acres of Washita and Arkansas quarry lands within 6 miles of Hot Springs, Ark., thus being prepared to furnish all shapes of Washita and Arkansas Stone, guaranteed to be as white and sharp gritted, and as well made and packed as any in the market. They have recently imported direct from Smyrna a large lot of the genuine Turkey Oil Stone rough rock, and can supply any desired shapes.

Our readers will observe the illustration given in the advertisement on page 38, of John A. Graham & Co., who are agents for the Rat Killer there represented.

The Biddle Hardware Company, Philadelphia, announce that since the death of their H. C. Spencer they have decided to divide his territory, so that their salesmen will be enabled to call upon their customers more frequently, and to this end they have arranged with J. H. O. Kemp, formerly of Baltimore, who, in connection with G. A. Rossington, will represent them in the South.

The Rockford Plow Company, Rockford, Ill., issue a convenient combined list and order sheet, which gives concise description and list prices of the goods, with blank spaces for the quantities desired.

H. W. Hill & Co., Decatur, Ill., issues, January 1, a striking new year's card in effective and unconventional style.

Newlin, Knight & Co., 337 Market street, Philadelphia, advise us that Joseph M. Rowland will call upon the trade in their interest along the line of the Pennsylvania Railroad, taking the place recently occupied by Mr. Spitz.

We are advised that W. A. Chenoweth, formerly with the Lloyd & Supple Hardware Company, Philadelphia, severed his connection with that house, and is now giving his entire time to his business in Birmingham, Ala., where he is a member of the firm of Thompson, Francis & Chenoweth, jobbers in Hardware.

The Hermann-Parker Hardware Mfg. Company, St. Louis, Mo., issue a striking calendar for 1887, calling attention to the fact that they are manufacturers of Gray Iron Shelf Hardware.

The A. F. Shapleigh & Cantwell Hardware Company in announcing that they have secured the spacious building Nos. 519 and 521 North Main street, St. Louis, one block north of the old stores, advise the trade that they have on hand and in transit, a fresh and new stock of goods, which they will guarantee to sell as low as any "jobbing house in the West, and the hope is expressed that their late misfortune will prompt their friends to favor them with their orders.

We are glad to learn that E. B. Pike, of the A. F. Pike Mfg. Company, Pike Station, N. H., who has entirely given up business for the past three months, and devoted his time to the care of Mrs. Pike, who has been dangerously ill, but is now convalescent, will be able to resume his business activities as before.

A new year's greeting is jointly issued by Nelson N. Williams as Western agent for the Hartman Steel Company and the Apollo

Iron and Steel Company, 68, 70 and 72 West Lake street, Chicago.

W. J. H. Gluck, Baltimore, Md., issues at the close of the past season a circular in which the business of last fall is alluded to as having been active, but at the same time unsatisfactory, especially in consequence of the strike at the foundry during the month of September, causing them to run short of many goods, thus subjecting their customers to more or less disappointment and annoyance. They state, however, that they are better prepared than ever to meet promptly the wishes of their customers, and are certain that if a strike occurs in 1887, it will be with some other concern. They have increased their facilities in Baltimore to double their former capacity. In consequence of the advance in the price of metals quotations of all special prices are with drawn.

The Manhattan Brass Company, First avenue, Twenty-seventh and Twenty-eighth streets, New York, issue a new catalogue devoted to their manufactures. Besides referring to Rolled and Sheet Brass, Brass, Copper and Zinc Tubing, Brass and Copper Wire, it is of interest as describing a varied line of Brass Goods, such as Burners, Lamps, Lanterns, Lamp Fixtures, Fenders, Fire Sets, Coal Hods, Oilers, Cuspadores, Jack Chain, Trays, Curtain Poles, Fixtures, &c., justifying the remark they make in their circular to the trade, that they have endeavored to furnish a large number of new, attractive and salable goods. To the Lamp and Glassware trade they offer their new Arctic and Sun Duplex Burners, and also refer to a new center-draft Lamp, the U. S. Electric, made with all brass, seamless tubes, spiral wick movement and of new and neat design. They also refer to their Fenders, Fire Sets, Andirons, Screens, &c., as including new designs of attractive styles offered at low prices, and call attention also to the reduction in price of their Patent Self-Righting Cuspadores, Spittoons, Candle Sticks, &c.

Our readers will observe the advertisement on page 43, in which the Troy Nickel Works illustrate their Alaska Fire Set and Stand, the cut indicating its special features.

The Huebner Mfg. Company, Detroit, Mich., call attention in their announcement on page 38, to their line of Patent Door Screens, Adjustable Window Screens, Window Screen Brackets, Frames, &c.

Buck Bros., the well-known Chisel manufacturers, Milbury, Mass., advise us that during the past year they have had a marked increase in the sale of the finest grades of their goods, such as are used by the most competent and expert workmen, and they refer to this class of goods as being also sent in increased quantities out of the country, and chosen in competition with the best makes of Sheffield goods. They also state that their regular goods are made of the same choice materials as heretofore, and under the constant personal supervision of the processes of manufacture, with a view to producing tools of the highest quality. They allude to their customers as having shown their approval of this course by their increased orders, while the number of their customers has also increased. Their terms have remained without marked change during the past year, and no immediate change is contemplated.

Announcement is made, January 1, by Marten Doscher, 111 Chambers street, New York, that he has associated George U. Dixon with himself in the Hardware and Commission business at the above location, under the firm name of Doscher & Dixon. Matters pertaining to the business previous to this date will be settled by Mr. Doscher. Mr. Dixon is known to many of our readers as having been connected with Sargent & Co., and will have the best wishes of the trade in his new departure.

The dissolution of the partnership heretofore existing between Franklin and Ellis F. Moore, Woodbridge, N. J., is announced, Franklin Moore retiring from the firm. The business will be continued by Ellis F. Moore at the old stand.

The copartnership heretofore existing between Elijah S. Pierce and James Ives, under the firm name of the Pierce Screw Company, Mount Carmel, Conn., has been dissolved by mutual consent. The business will be continued by James Ives.

The Connecticut Valley Mfg. Company, Centerbrook, Conn., allude to the success of their efforts in bringing their Wrights Jennings Bits to a high state of perfection, describing them as of superior quality.

The Hill's Archimedian Lawn Mower Company, Hartford, Conn., issue circulars describing the Leader and the Daisy Lawn Mowers of their manufacture, giving illustrations and list prices, together with recent testimonials in regard to the goods.

Our readers will observe the effective announcement of the American Arms Company, Boston, Mass., on page 20, in which are illustrated the new goods to which they call special attention. An examination of the illustrations will show the style of their Revolver, which is offered to the trade as equal to any in the market, combining all the desirable points hitherto obtained, together with others of value, while it is sold at prices which are alluded to as less than those which have prevailed for the best goods. Their latest production is the Double-

Action Automatic Extracting Revolver, on the merit of which they lay special emphasis, alluding particularly to the shape of the handle as the most perfect yet produced, and commending itself at once on trial. While the Double-Action Automatic Extracting Revolver is perhaps at the present time the most popular style, the company are also producing an action which is described as less liable to get out of order than any other, and almost as rapid in the facility of extracting the empty shell. With reference to the Double and Single Action Ring Extracting Revolvers, which in the opinion of many experts are equal if not superior to the Automatic Extracting, the Extracting is, it is to be observed, wholly under the control of the operator, as the arm can be opened entirely without extracting at all, and then by drawing the extractor wholly or partially out shells can be wholly or partially expelled as desired. The Ring Extracting are in 38 caliber, and the Automatic Extracting in 32 and 38 caliber. The 32 caliber use a long or short shell as desired, all of them using S. & W. Cartridges. The company advise us that they have in use nearly 20,000 of their Single Barrel Shotguns Semi-Hammerless, a cut of which is also shown. They are referred to as combining the best elements of the hammerless Guns and none of the dangers. The little lever on the side cocks the Gun and answers for an index as to whether it is cocked or not. They are described as well and honestly made of the best material, foreign wood stock, genuine twist and Damascus barrels with excellent shooting qualities. The company are also the makers of the well-known Fox Patent Double Gun with a sliding action, a cut of which is shown.

REVIEW OF THE HARDWARE MARKET FOR THE FIRST HALF OF 1886.

January.—The year opened with the announcement of several changes in the prices of leading goods, some in the way of advances and others of reductions in price, the market in general being characterized by a moderate tendency toward slightly better prices. The market for Barb Wire was firm at \$4.62 1/2 for carload lots of four-point. Nails were quiet, fairly firm and quoted in carload lots at \$2.25 on dock. The price of Screws was advanced under date January 1, the discount of the American Screw Company being made 75 and 10 per cent., while the discount of the Russell & Erwin Mfg. Company and other companies using another list was 83 1/2 per cent. Brass Kettles were advanced January 2 to 22 and 24 cents for the smaller and the larger sizes respectively. A new discount sheet on Tacks was issued by the Central Mfg. Company, which was then in existence, in which the base price of American Iron Carpet Tacks was 55 per cent. discount. A new discount sheet was also issued by the Covert Mfg. Company, the prices being substantially the same as in their previous issue. The discount sheet of the American Screw Company, beside the advanced prices on Screws, gave also revised discounts on the rest of their line, with the announcement of the addition of some new goods. Slightly higher prices were announced for Wire, Coil Chain, Nuts, Washers and Machine Bolts. Tackle Blocks, Shovels and Spades and Wrought Brass Butts were more or less irregular. The middle of the month found the volume of business continuing moderate, with the announcement of some changes in price, mostly in the way of advance, there being some reaction from the extreme competition during the past season, which had reduced profits to a minimum, and also a response to the higher price of iron, with a hopeful feeling prevailing. There was apparent a tendency on the part of some manufacturers to advance prices prematurely, in anticipation of a large demand. It was not found feasible by the Axe manufacturers to carry out measures which were under consideration, with a view to strengthening the prices of these goods, which were, however, held with somewhat more firmness. The manufacturers of Wire Nails made an advance of about 5 per cent., and higher prices were established for Washita Stone, Stebbins' Molasses Gates and Cast Butts. Revised discount sheets were issued by Nimick & Brittan Mfg. Company and the Peck, Stow & Wilcox Company. John Chattillon & Sons sent out a new price list with revised discounts. A further advance was announced in Plain Wire, and several leading lines of goods were held at slightly higher prices. Locks had more regularly under the recently revised price, than had characterized them for some time. At the close of the month the volume of business was fair and the general situation regarded as more satisfactory than for several years. An effort was made by the leading jobbing houses of the West looking to a maintenance by them of any advances which may be made by the manufacturers. Advanced prices of Steel Goods, Wire, Cast Butts and other lines is noticed. C. W. Dunlap & Co. issue, January 15, a revised discount sheet, and the Lockwood Mfg. Company revised list prices of their Locks, Latches, &c., the discount being announced as 50 per cent.

February.—The month opened with a moderate demand, which was not up to the expectations which had been entertained, but there was still a strong tone in prices with the announcement of some advances. Files were in better condition than for some time and held at somewhat

LOCKS.

Comparative Table showing the old and new prices on certain leading numbers.

Nimick & Britton Mfg. Co.	Mallory-Wheeler Co.'s No.	Russell & Erwin Mfg. Co.'s No.	DESCRIPTION OF LOCKS.	List prices January 1, 1887.	Net prices at 45 and 10 per cent. discounts from list December 18, 1886.	Net prices at 60 per cent. dis- count from list January 1, 1887.
01001...	0...	2040...	Mortise Knob Lock, 1 1/2 x 3 1/2, Iron Front and Bolt.	\$1.75	\$ 0.49	\$ 0.70
1002...	103...	60...	Mortise Knob Lock, 1 1/2 x 3 1/2, Iron Front and Bolt.	3.10	1.12	1.24
1003...	105...	61...	Mortise Knob Lock, 1 1/2 x 3 1/2, Iron Front and Brass Bolt.	4.00	1.49	1.60
1005...	109...	12 1/2...	Mortise Knob Lock, 1 1/2 x 3 1/2, Brass Front and Brass Bolt.	5.60	1.98	2.24
1061...	0570...	...	Mortise Knob Lock, 3 1/2 x 3 1/2, Iron Front, Iron Bolts, Tinned Key.	5.25	1.87	2.10
1063...	0581...	2002...	Mortise Knob Lock, 3 1/2 x 3 1/2, Iron Front, Brass Bolts, Brass Key.	7.70	2.72	3.08
1072...	0584...	2003...	Mortise Knob Lock, 3 1/2 x 3 1/2, Brass Front, Iron Bolts, Brass Key.	8.40	2.97	3.36
1083...	0587...	2004...	Mortise Knob Lock, 3 1/2 x 3 1/2, Brass Front, Brass Bolts, Brass Key.	8.75	3.04	3.50
1141...	0179...	0 1/2...	Mortise Knob Lock, 4 x 3 1/2, Iron Front, Iron Bolts, Tinned Key.	6.30	2.48	2.52
1142...	0183...	0 1/2...	Mortise Knob Lock, 4 x 3 1/2, Iron Front, Iron Bolts, Brass Key.	7.70	3.09	3.08
1143...	0181...	0 1/2...	Mortise Knob Lock, 4 x 3 1/2, Iron Front, Brass Bolts, Brass Key.	9.10	3.71	3.64
1152...	0185...	1 1/2...	Mortise Knob Lock, 4 x 3 1/2, Brass Front, Iron Bolts, Brass Key.	10.15	3.96	4.06
1153...	0187...	2...	Mortise Knob Lock, 4 x 3 1/2, Brass Front, Brass Bolts, Brass Key.	11.20	4.46	4.48
1323...	92...	35...	Sliding Door Lock, 5 x 3 1/2, Astragal Front, Brass Bolts, Brass Key.	25.20	9.90	10.08
701...	101 1/2...	604...	Horizontal Rim Dead Lock, 3 x 2, Iron Bolt and Key.	2.30	0.81	0.92
702...	170 1/2...	605...	Horizontal Rim Dead Lock, 3 x 2 1/2, Iron Bolt and Brass Key.	4.00	1.83	1.96
721...	193...	606...	Horizontal Rim Dead Lock, 3 1/2 x 2 1/2, Iron Bolt and Iron Key.	3.15	1.06	1.26
722...	195...	607...	Horizontal Rim Dead Lock, 3 1/2 x 2 1/2, Iron Bolt and Brass Key.	4.00	2.23	1.06
731...	103...	612 1/2...	Horizontal Rim Dead Lock, 4 x 2 1/2, Iron Bolt and Iron Key.	6.30	2.23	2.52
736...	171...	612 1/2...	Horizontal Rim Dead Lock, 4 x 2 1/2, Iron Bolt and Brass Key.	6.05	2.84	2.66
501...	0230...	260...	Horizontal Rim Knob Lock, 5 x 3 1/2, Iron Bolt and Iron Key.	7.00	2.48	2.80
503...	0231...	270...	Horizontal Rim Knob Lock, 5 x 3 1/2, Brass Bolt and Brass Key.	10.50	3.96	4.20
531...	0243...	262...	Horizontal Rim Knob Lock, 5 x 3 1/2, Iron Bolts and Iron Thumb Bolts and Iron Key.	8.05	2.84	3.22
533...	0235...	272...	Horizontal Rim Knob Lock, 5 x 3 1/2, Brass Bolts and Brass Thumb Bolts and Brass Key.	11.01	4.58	4.76
763...	472 1/2...	2439...	Horizontal Rim Store Door Dead Lock, 5 x 4, Iron Bolt, two Folding Keys.	18.20	7.29	7.28
783...	468...	2490...	Horizontal Rim Store Door Dead Lock, 6 x 5, Iron Bolt, two Folding Keys.	25.90	9.16	10.36
793...	419...	2491...	Upright Rim Store Door Dead Lock, 5 x 4, Iron Bolt, two Folding Keys.	25.20	7.29	10.08
231...	01...	860 1/2...	Upright Rim Store Door Dead Lock, 6 x 3 1/2, Iron Bolt, two Folding Keys.	25.90	9.16	10.36
232...	01 1/2...	861 1/2...	Upright Rim Knob Lock, 4 x 3 1/2, Iron Bolts and Iron Key.	4.00	1.85	1.96
233...	01 1/2...	862 1/2...	Upright Rim Knob Lock, 4 x 3 1/2, Iron Bolts and Brass Key.	6.05	2.47	2.66
221...	01 1/2...	862 1/2...	Upright Rim Knob Lock, 4 x 3 1/2, Brass Bolts and Brass Key.	7.70	2.72	3.08
001...	001 1/2...	1900 1/2...	Upright Rim Knob Lock, 4 x 3 1/2, Iron Bolts and Iron Key.	3.85	1.09	1.54
0221...	001 1/2...	1900 1/2...	Upright Rim Knob Lock, 4 x 3 1/2, Iron Bolts and Brass Key.	5.25	1.54	2.10
252...	001 1/2...	866...	Upright Rim Knob Lock, 4 x 3 1/2, Iron Bolts, Brass Key and Thumb Bolt.	7.35	2.67	2.94
253...	0001 1/2...	867...	Upright Rim Knob Lock, 4 x 3 1/2, Brass Bolts, Brass Key and Thumb Bolt.	8.75	3.17	3.50
100...	218...	413...	Mineral Door Knobs, Japanned.	2.10	0.75	0.84
110...	238...	310...	Porcelain Door Knobs, Japanned.	2.45	0.87	0.98
120...	442...	110...	Porcelain Door Knobs, Electro-Plated Mountings.	7.35	2.60	2.94
130...	446...	101...	Porcelain Door Knobs, Electro-Plated and Porcelain Mountings.	8.20	2.97	3.28
0401...	00239 1/2...	0250 1/2...	Horizontal Knob Lock, 4 1/2 x 3 1/2, Iron Bolts, Iron Key.	4.20	1.21	1.68
0402...	00247 1/2...	1250 1/2...	Horizontal Knob Lock, 4 1/2 x 3 1/2, Iron Bolts, Brass Key.	5.60	1.66	2.24
013...	0231 1/2...	1252 1/2...	Horizontal Knob Lock, 4 1/2 x 3 1/2, Brass Bolts, Brass Key.	8.40	2.97	3.36
01051...	00579...	2000...	Mortise Knob Lock, 3 1/2 x 3 1/2, Iron Fronts and Bolts, Brass Key.	3.85	1.09	1.54
01052...	00583...	2001...	Mortise Knob Lock, 3 1/2 x 3 1/2, Iron Fronts and Bolts, Brass Key.	5.25	1.53	2.10

higher figures. An attempt was made to make the base discount 55 per cent. instead of 60 per cent., and this quotation was used by some manufacturers. The liberality with which extra discounts on Tacks were given to large buyers had the effect of inducing some cutting of prices. The A. F. Pike Mfg. Company issued a revised list, and John H. Graham & Co. published an illustrated catalogue of 400 pages relating to their line of goods, sending out with it a discount sheet applying to the entire line. As the month progressed the volume of business did not show much improvement, trade having been repressed by severe weather which generally prevailed. Nails manifested a strong tendency, and Barb Wire was held at \$4.75 for carload lots of Four-Point Galvanized, a quotation which was made only to lots for prompt shipment. Horsehoes were slightly advanced. Some leading goods, among which may be mentioned Boxwood Rules, Rivets and Bright Wire Goods, were more or less irregular in price, while Steel Goods, Tackle Blocks, Blacksmiths' Bellows and Shot were held firmly with slight advances in some instances. There was a discussion in regard to the maintenance of prices by the jobbers of the country, and efforts which were not entirely resultless were made in this direction. Landers, Frary & Clark issued their catalogue No. 9, which represents their manufactures with the exception of Table Cutlery. A discount sheet applying to it was also sent out. The latter half of the month found Nails stronger and in increased demand, Barb Wire being quiet at unchanged figures. The most important announcement was of the adoption of standard Screw lists by the united action of the manufacturers, the former lists being discarded. This new list bore date February 15, and was subject to the regular discount of 75 and 10 per cent. on Flat Head Iron Screws. At the new prices there was a general but irregular advance. The leading manufacturers of Cast Iron and Shelf Hardware had been conferring with reference to an advance in this line, which was determined upon, the revised discounts to be announced later. Brass Butts developed a new irregularity. Cast Butts were held somewhat more firmly, and advanced prices announced on Norway Tire Bolts. The Reading Hardware Company issued a new discount sheet, and the Moore Mfg. Co. a new catalogue and discount sheet. The month ended with a hopeful feeling. Comparatively few changes were announced, except those alluded to above, announcing which, revised discount sheets were issued by Sargent & Co., the Peck, Stow & Wilcox Company, and in process of preparation by others. The Menely Hardware Company issued a new catalogue of their Harness Snaps, &c., accompanied by a discount sheet. Barb Wire and Nails continued firm with an increased demand for the latter.

March.—The month opened with a fair activity and the general acknowledgment of an undoubted improvement in business, the

volume, of which, however, was not up to the more sanguine expectations entertained earlier in the year. Sargent & Co. issued a preliminary catalogue and price list of Door Locks, Knobs, Escutcheons, &c., thus coming openly into the market as manufacturers of this line of goods, while the prices of Cast and Wrought Iron Bolts, Shot, and Silver-Plated Ware were stronger, with slight advances. Manila Rope slightly receded, and the prices of some leading goods continued irregular. Reduced prices were announced by Hammer & Co. on their Old Pattern Malleable Oils. The discount sheet of the Russell & Erwin Mfg. Company, giving their revised prices, was published, as were also the discount sheet of P. & F. Corbin. Early in the month demands for increased wages were being made, and in many cases were acceded to by the manufacturers, thus inducing a continued firmness in price with a tendency toward slightly higher quotations. The demand, however, was only fair, and the large houses manifested some reluctance to purchase freely. Not many changes in price are to be noticed, although Locks showed increased firmness and there was a disposition on the part of some manufacturers to make the base discount 45 instead of 50 per cent. The most important feature in the Hardware market during the month was probably the announcement of the approaching dissolution of the Central Mfg. Company, and the resulting entrance sooner or later into the market of the manufacturers composing it without the restriction of any agreement as to prices or production. It was generally recognized that the breaking down of this combination, which had been so long and rigidly maintained, would result in a demoralization in the price of Tacks, and this fact was not without some influence in slightly depressing the tone of the market. While Locks continued to be held firmly, Padlocks remained irregular, and the printed discount of 66 2/3 per cent. was becoming nominal. The advanced prices of Horsehoes were firmly maintained. The Stanley Works issued, under date March 3, a revised discount sheet embodying a good many changes. Toward the close of the month the railroad strikes in the West were exerting an injurious influence upon trade, and the volume of business was consequently somewhat reduced. The aggregate for the month was fair, and the hope was expressed that the labor difficulties would be of short duration. The manufacturers of Augers and Bits were in consultation with reference to the feasibility of advancing prices, which were regarded as low. The manufacturers of Tackle Blocks made a reduction in their prices. Discount sheets were issued by John Chatillon & Sons, the Wire Goods Company and Sargent & Co. The month closed with a remarkably steady market, there being few changes in prices, and not much modification in the volume of business, but there was a feeling of uncertainty which acted as a disquieting element, and gave a lack of confidence as to the future.

April.—There were comparatively few changes of price during the month, the principal feature of which was the disturbing effects of the labor agitation, in which the Western railroad strikes had a prominent place. The month opened with a somewhat disappointing demand mainly on this account. As the month progressed there was something of a falling off in the volume of business, and it closed with transactions limited to the requirements of the trade, a lack of confidence having been developed which was exceedingly repressing to manufacturing and mercantile activity. With the 1st of April most of the Tack manufacturers, members of the association, were in the open market, the termination of their connection with the Central Mfg. Company being officially announced. Shortly afterward A. Field & Sons and other manufacturers issued discount sheets in which American Iron Carpet Tacks were quoted at the base discount of 65 per cent., the Stanley Works issuing another discount sheet starting with Swedes Iron Cut Tacks at a base discount of 60 per cent. This latter discount sheet was soon withdrawn and Field's adopted. The market for this line of goods continued unsettled, there being a perplexing divergence of printed quotations and much uncertainty in regard to bottom prices. In the middle of the month the Nail market was weaker and somewhat demoralized, and the demand for Barb Wire was limited to small lots. April 13 the Wire Nail Association adopted a Wire Nail list, an advance being made on the small sizes. The card rate of Standard Wire Nails was reduced, in sympathy with the weaker condition of the Cut Nail market. Van Wagoner & Williams Company issued a new catalogue embodying many changes in list prices and in connection with it revised discounts. On April 15 the leading Sandpaper manufacturers formed an association, adopting a uniform list and a schedule of quantity discounts, by which the prices on this line of goods were heavily advanced. During the month goods generally were fairly firm in price, but some leading lines were more or less irregular, and there was a good deal of cutting by parties who had purchased freely in anticipation of a larger demand than was experienced.

May.—Trade continued to feel the depressing effect of strikes, disturbances and agitations in connection with labor questions, and the month was characterized by an unusually light business for the season. Many manufacturers pursued the policy of restricting their production, manifesting an unwillingness in that condition of things to make goods much in excess of the demand of the trade. Nails and Barb Wire were weaker and lower prices made. The month closed with a slightly better feeling in trade circles, but no increase in the volume of business. Prices remained substantially unchanged, with light fluctuations in special lines.

June.—The month opened with only a moderate trade, manufacturers' prices in nearly all lines being firmly maintained, and

during the month there were few announcements on the part of manufacturers of much significance. While the trade were generally disappointed with the season's business a more hopeful feeling prevailed, and among the favorable features of the situation a disposition on the part of manufacturers was manifested to refrain from forcing goods on the market by means of inducements in price. There was more than the usual complaint about collections, which, especially in some parts of the country, were regarded as exceptionally slow. During the month the Tack market, which had continued for some time without material change, developed lower quotations, and there was some irregularity also in the price of Locks, Tackle Blocks, Screws, Nails, Barb Wire, Scandinavian Padlocks, Files, Scythe Snaths and Cradles and other goods, the month closing with the usual limited demand for small lots to supply immediate wants.

PRICES DURING 1886.
The following comparative table of the prices of leading lines of Hardware at the opening of 1886 and 1887 will be of interest. The respective quotations are given as representing as nearly as may be the market prices at the dates indicated. Where a new list has been adopted it is marked by an asterisk (*):

	January 1, 1886	January 1, 1887
Cartridges, Rim...	60¢ 2 1/2	60¢ 2 1/2
Capa, Percussion...	25¢ 5	25¢ 5
Augers and Bits...	70¢	60¢ 10¢
Axes, Best...	\$6.25 @ \$7.00	\$6.50 @ \$7.00
Axes, Nos. 1 to 6...	34¢	34¢
Axes, Nos. 7 to 18...	60¢ 10¢	60¢ 10¢ 5
Axes, Nos. 19 to 22...	70¢ 10¢	70¢ 5
Axes, Nos. 23 to 26...	60¢ 10¢	60¢ 5
Spring Balances...	50¢	50¢
Light Hand Bells...	80¢ 5	75¢ 10¢ 5
Blacksmiths' Bel-		
lows...	50¢ 10¢ 5	60¢
Rubber Belting, standard...	70¢ 5¢ 5	70¢ 10¢ 5
Rubber Belting, extra...	60¢ 10¢ 5	60¢ 10¢ 10
Rubber Belting, N. Y. B. & P. Co. standard...	60¢ 5	70¢ 5
Belting Rubber, N. Y. B. & P. Co. extra...	50¢ 10¢ 5	60¢ 5
Tackle Blocks...	30¢ @ —	60¢ 10¢ 5
Bolts, Cast Iron, Barrel, &c...	70¢ 5	70¢ 10
Bolts, Wrought Barrel, &c...	70¢ 5	70¢ 10
Carriage Bolts, Common...	80¢ 5	75¢
Carriage Bolts, Genuine Eagle...	75¢ 5	75¢ 5
Carriage Bolts, Philadelphia Pattern...	75¢ 10¢ 5	75¢ 10¢ 5
Carriage Bolts, R. B. & W. standard...	70¢ 5	70¢ 5
Tire Bolts, Common...	70¢	70¢
Tire Bolts, R. B. & W. Machine Bolts...	80¢	70¢ 10
Bright Wire Goods...	70¢ 10¢ 10	75¢ 10
Butts, Wrought Brass...	70¢	80¢
Butts, Cast Iron...	60¢ 10¢ 10	70¢ 10
Butts, Wrought Iron...	60¢ 10¢ 10	65¢ 5¢ 2
Casters...	60¢ 10	*60¢ 5
Chain, Trace...	60¢	60¢
Coil, 1/4 inch...	6¢	5 1/2¢
Coil, 1/2 inch...	4 1/2¢	4¢
Chisels, Socket Framing, &c...	80¢	75¢ 5
Brass Cocks, Hardware List...	65¢ 5	55¢ 10¢ 2
Coffee Mills...	45¢ 10¢ 2	45¢ 10¢ 2
Cradles, Grain...	40¢ 5¢ 2	50¢
Drawing Knives...	80¢	75¢ 5
Dripping Pans...	5 1/2¢	5 1/2¢
Files, best brands...	60¢ 10	60¢ 10¢ 10
Files, lower grade...	70¢ @ —	70¢ @ 70¢ 10
Forks, Hay, Manure, &c...	60¢ 10¢ 10	60¢ 10¢ 10
Handles, Hammer, Hatchet, &c...	35¢	25¢ 5
Hinges, Strap and T. Hinges, Screw Hook and Strap, 8 to 12 inch...	65¢ 5¢ 2	65¢ 5¢ 2
Hoes, Handled...	3 1/2¢ to 4¢	4 to 4 1/2¢
Stove Hollow-ware, Ground...	50¢ 10¢ 5	60¢ 10¢ 5
Stove Hollow-ware, Unground...	60¢ 10	70¢ 5
Enameled Kettles...	50¢ 10	50¢ 10
Oval Boilers, Saucepans, &c...	80¢ 5	80¢
Belt Hooks...	80¢	80¢
Rubber Hose, low grade...	70¢ 5	75¢ 10¢ 5
Hose, N. Y. B. & P. Co. standard...	70¢ 10¢ 5	60¢
Brass Kettles, 7 to 17 inches...	30¢	22¢
Tubular Lanterns, without guards...	\$6.75	\$5.75
Tubular Lanterns, No. 6 Lift, Wire without guards...	8.50	8.50
Door Locks...	50¢ 2	45¢ 10
Cabinet Locks...	40¢ 2	40¢ 2
Padlocks...	70¢ 10	75¢ 5
Molasses Gates, Stebbins' pattern...	75¢ 10	75¢ 5
Molasses Gates, Stebbins' Genuine Wire Nails...	70¢ 7 1/2¢ 10	60¢ 5¢ 10
Picks...	80¢ 10	*50¢ 10
Wrought-Iron Pipe, 1 1/2 and under, plain...	43¢ 1/2	35¢
Wrought-Iron Pipe, 1 1/2 and under, galvanized...	52¢ 1/2	25¢
Wrought-Iron Pipe, 1 1/2 and over, plain...	50¢	52 1/2¢
Wrought-Iron Pipe, 1 1/2 and over, galvanized...	49¢ 1/2	35¢
Planes, Bench, first quality...	30¢ 2 1/2 +	30¢ 2 1/2 +
Planes, Bench, second quality...	25¢ 2 1/2 +	25¢ 2 1/2 +
Pumps, Clatern, best makers...	50¢	50 @ 60¢ 10
Pumps, Pitcher, Spout, best makers...	60¢	60¢ 10¢ 10
Pumps, Pitcher, Spout, cheaper goods...	70¢ 5	70¢ 10¢ 5
Rakes...	60¢ 10¢ 10	60¢ 10¢ 10
Iron Rivets, Flat Head...	50¢	*60¢
Copper Rivets and Bars...	60¢ 10	60¢ 5
Manilla Rope, 1/2 inch and larger, list...	18¢	18¢
Sisal Rope, 1/2 inch and larger, list...	9¢	11¢

Rules, Boxwood...	80¢ 10	80¢ 10 @ 80
Sandpaper...	45¢	45¢ 10 10
Sash Weights, ton lots...	\$20	\$22.50
Screws, flat head Iron, American Screw Company...	75¢ 10 +	*75¢ +
Screws, flat head iron, R. & E. list...	85¢ +	*75¢ +
Horse Shoes...	\$3.60	\$3.75
Shot, 25-pound bag...	\$1.35	\$1.60
Squares, steel and iron...	70¢ 10¢ 10	70¢ 10¢ 10
Blacksmiths' Stocks and Dies...	25¢	40¢
Tacks, American Iron Carpet...	55¢ 10¢ 2	75¢
Tacks, Swedes Iron Carpet...	50¢ 10¢ 2	75¢
Tacks, American Iron Cut...	50¢ 10¢ 2	70¢ 10
Finishing Nails...	45¢ 10¢ 2	55¢
Hungarian Nails...	35¢ 10¢ 2	40¢
Tacks, Leathered Carpet...	25¢ 10¢ 2	40¢ 7 1/2
Tacks, Double-Pointed...	80¢	80¢ 10
Solid Box Vises...	60¢	50¢ 10¢ 5
Wire, Market, Bright and Annealed, 0 to 18...	70¢ 5	70¢ 5
Wire, Brass and Copper...	30 1/2¢ @ 30¢ 10	25¢ 5
Wrought Goods...	80¢ 20	80¢ 25
* New List.		

NAILS IN 1886.

During the year 1886 the New York market has closely reflected the condition of the Nail trade throughout the country, because for the greater part of the period under review it influenced and was affected by the status of affairs west of the Allegheny mountains. The strike in the Western Nail mills entered into during the summer of 1885 had thrown upon the Eastern works practically the task of supplying the whole country, and though the scarcity never approached the condition of a famine, prices had advanced heavily during the fall of 1887. When with the approach of the winter season the inquiry fell off prices declined quite rapidly, the downward tendency being aided by the fact that quite a number of Western manufacturers succeeded in training their former feeders to do the work of the striking nailers. These were the conditions prevailing when the year opened with the light demand characteristic of that season. Nails, which had been as high as \$2.75, had reached \$2.25, and for carload lots on dock in the middle of the month of January, during a temporary flurry, dropped to \$2.15, closing, however, a little stiffer, though with occasional indications of irregularity. Early in February an awakening of the demand from the West and a more hopeful feeling in regard to the prospective spring demand steadied the market, which rose again to \$2.25. In the middle of the month overtures were made in the West to settle the strike, but they failed. At this time about 1000 machines were being run by feeder nailers under the terms of the manufacturers, while 466 machines were being run at the rates demanded by the men. Later in the month the Junction Iron Company, at Mingo, Ohio, entered into a compromise with their men, known as the Mingo scale, which placed the rate for cutting Nails, on the basis of a \$2.25 card rate, at 19 cents, with a 10 per cent. reduction for self-feeders. Although a number of other mills followed suit, this did not for the time being affect the market much, the price being \$2.40 at the beginning of March. That month settled the contest between buyers and sellers. It was characterized by fitful efforts to sell on the part of weak holders and great caution on the part of purchasers, so that the price receded to \$2.25. In April the decline continued, and when the general unsettling of business came through the labor troubles the drop became more pronounced, and toward the end of May occasional sales were made as low as \$1.90. In June even lower figures were made, though usually under exceptional circumstances, the average price for the month probably close on \$1.90. On the 25th of that month there was a settlement of the long nailers' strike, the manufacturers offering and the men finally accepting a compromise scale of 17 cents on the \$2.20 base, as against 20 cents on a \$2.25 base originally demanded by the nailers, and 15 cents on a \$2 base offered by the manufacturers. This settlement did not at once bring about a general resumption of work, because a number of complications arose. Meanwhile July was ushered in with a further weakness in the Eastern markets, and prices dropped as low as \$1.80. This grew so alarming that Eastern manufacturers, at meetings held at Philadelphia and New York, agreed not to sell below \$2.10. The immediate result was a general holding off of buyers and a gradual appearance upon the market of lots from second hands. Manufacturers seemed to hold their price near to \$2.10 for the greater part of August, but early in September a general weakness developed, and before the end of the month the trade was in as unsatisfactory and unsettled a condition as it had ever been. In spite of a general rising tendency in raw materials prices declined, until they were down to \$1.80 in October. It dragged along during that month and during all of November, with only slight indications of betterment toward the close of that month. December opened with a slightly better feeling, and when toward the end of the month sellers suddenly reached the conclusion that considerably better prices must be obtained to counterbalance increased cost, a number of sales were made at about \$2 for carload lots, the market quickly advancing to \$2.10, and finally to \$2.15 in the East, the card rate in the West being \$2.40.

L. COES'
GENUINE IMPROVED
Knife Handle
PATENT
Screw Wrenches
MANUFACTURED BY
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Worcester, Mass.
ESTABLISHED IN 1839.



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Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.
Straight Bar, Extra LONG NUT FOR SCREW IN JAW.

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Send for Illustrated Price List and Circular.

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MANUFACTURERS OF THE

BAILEY DRILL.
Possesses more points of merit than any other Drill on the market, among which are the following: The entire spindle and feed screw are of Steel. The self-feed may be used or not, as desired, and can easily be changed to slow or fast feed. Table can be fastened at any desired point by an improved cam. Through an intermediate gear, balance wheel may easily be disconnected. Different speeds may be obtained by changing crank from one shaft to another. All parts are interchangeable, and every Drill is set in perfect line and tested before shipping.

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American Manufacturing Company,
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AMERICAN MANUFACTURING CO.
IMPROVED PATTERNS
TRANSOM LIFTER
ONLY SELF LOCKING
TRANSOM LIFTER UPON
THE MARKET, EASILY
ADJUSTED, STRONG
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SOLID STEEL WITH MALLE-
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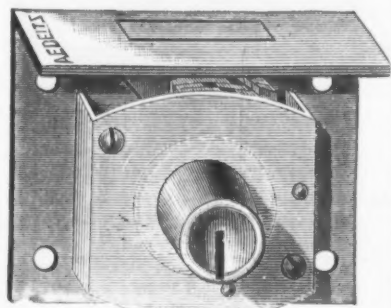
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FOR SALE BY
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FLORENCE
OIL STOVES
ARE BEST FOR ALL PURPOSES
FOR SALE EVERYWHERE
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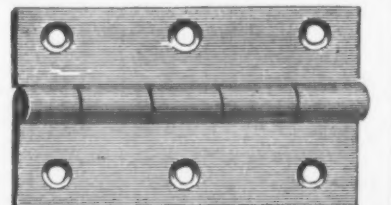
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The attention of Hematite ore miners is called to our new Jig. The simplest and most effective separator now in use.
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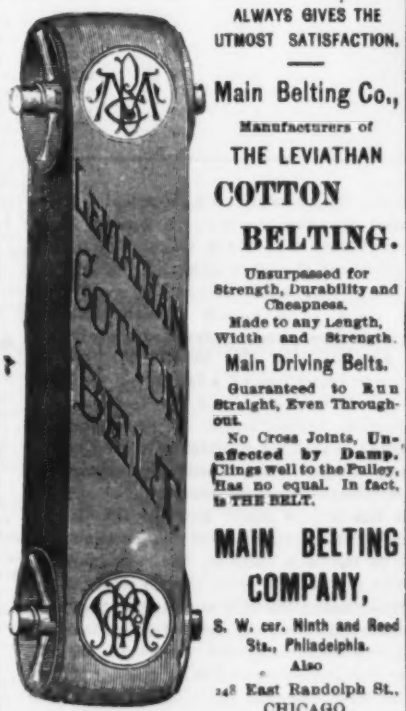
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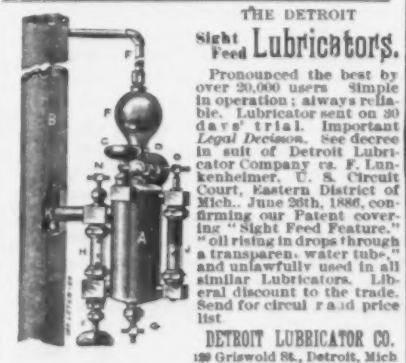


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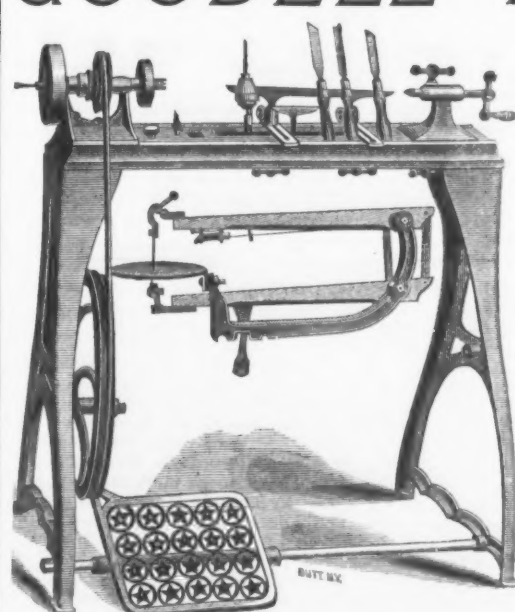
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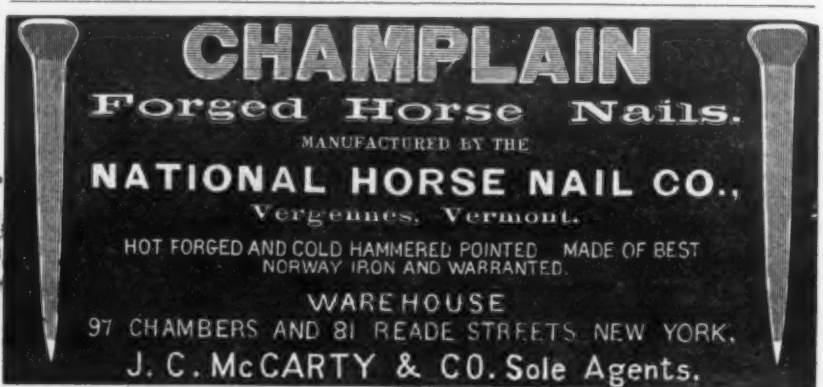
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CHAMPLAIN
Forged Horse Nails.
MANUFACTURED BY THE
NATIONAL HORSE NAIL CO.,
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HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST NORWAY IRON AND WARRANTED.
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New York Office, No. 221 Pearl, Corner Platt Street,
MANUFACTURERS OF
BEST CHARCOAL
BOILER PLATES,
AND PLATE IRON GENERALLY.
ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we manufacture expressly for the Shells of Steam Boilers and stamp 50,000 pounds T. S. when desired. One hundred and sixteen tests of this iron, made during the last three years by the U. S. Inspectors of Steam Vessels, show an average tensile strength of 58,808 pounds to the sectional square inch, and an average reduction of area of the fractured section of 30% per centum. Our prices are as low as the production of a good article will admit of.

POTTSVILLE IRON & STEEL CO.,
POTTSVILLE, PA., Manufacturers of all kinds of
STRUCTURAL STEEL AND IRON
Viz., BEAMS, CHANNELS, TEES, ANGLES, PLATES AND BARS; Also STEEL AND IRON AXLES FOR FREIGHT AND PASSENGER CARS.

This Steel is manufactured by the CLAPP-GRIFFITHS process, and is specially adapted, in addition to the above, for Boiler and Bridge Rivets, Wire Rods, Nail Plates, &c. &c. Our Mild Steel is well adapted for use in place of the best quality of Wrought Iron; where a greater strength and ductility is required, it welds readily as Iron. Also Billets, Slabs of all sizes and any desired temper. Shaping of all sizes in stock, from which prompt shipments can be made.

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South Walpole, Mass.

Globe-Jawed Bit Brace.

Amidon & White, 135 Main street, Buffalo, N. Y., are just introducing a new bit brace, the peculiarities of which are in the chuck or device for grasping the bit. By reason of its shape the part is described as "globe-jawed." It is clearly indicated in Fig. 1 of the engravings, which repre-

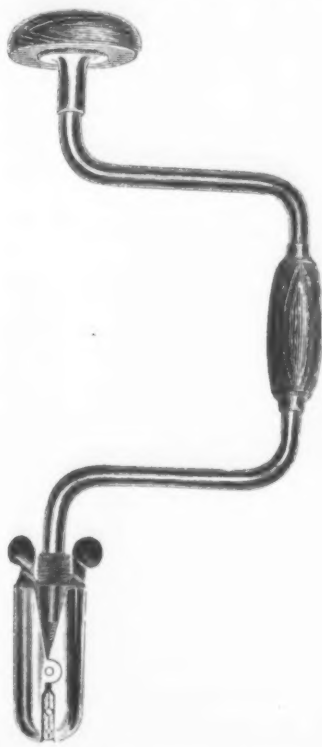


Fig. 1.—Globe-Jawed Bit Brace.

sents a vertical section through the jaw. The jaw is operated by means of a winged nut which serves by means of a wedge to close the jaws, which are pivoted nearly midway of their length. The front of each jaw is provided with a half-sphere grooved so as to fit around the shank of the bit. Each half of the sphere fits in a cup-like shape given to the end of the jaw, and the grooves are made in sets of different sizes. Accordingly the parts are turned in order to secure the size of groove necessary to fit the bit that is to be used.

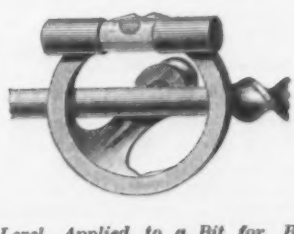
Both bits and drills can be used in the same jaw, and irregular pieces of metal if desired are likewise firmly held. The bit may be inserted as shown in the sectional view, or it can be held by the globe device alone in case the full length of the bit is wanted for boring. The makers claim that this is the most complete brace ever made. It is simple, substantial and quickly operated. It will hold the largest shank bits down to the smallest drills, whatever may be the shape of the shank, including round, square or tapering. Each shape secures the "screw-lever-and-wedge" grip which the device provides. The article is made both plain and with ratchet attachment. It is manufactured in four sizes, viz., 8, 10, 12 and 14 inch sweep. The tool is handsomely made and is fully nickel-plated. The sweep is of steel, the head is of lignumvitæ and the handle of cocobola.

Stanley's Bit and Square Level.

Boring with precision is one of the everyday requirements of mechanics in the various wood working lines. Just how to accomplish this feat, however, is something which mechanics do not find so easy to determine in all cases. The device shown in two applications in the cuts below is a very satisfactory answer to the question. The device shown is also serviceable as an attachment for framing squares, try



Level Applied to a Bit for Boring Vertically.



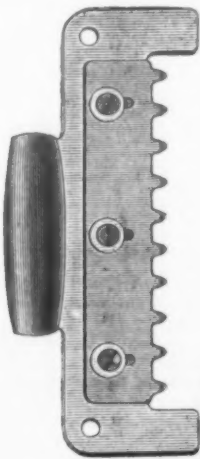
The Level Applied to a Bit for Boring Horizontally.

squares and other similar tools, converting them into fair substitutes for the ordinary spirit level. A test of the merit of an article is often found in the inquiry, "Why did not somebody think of that before?" The device shown in the cuts referred to suggests this question to every mechanic who has attempted to bore holes vertically or horizontally, and has been troubled to find some convenient means of accomplishing this end. The article is so simple that a description of it is scarcely necessary. The frame of the level has three pairs of V-slots on its back edges. The shank to a bit will lie in these slots, either

parallel to the bubble glass or at an exact right angle with it, or intermediate between the two—that is, at an angle of 45°. A thumb-screw secures the level to the bit in either position, and accordingly the boring can be done with perfect accuracy as to perpendicular, horizontal or angle of 45°, simply by watching the bubble glass while turning the bit. This article is being put upon the market by the Stanley Rule and Level Company, 29 Chambers street, New York City.

Adjustable Clapboard Marker.

The Stanley Rule and Level Company, of New Britain, Conn., and with New York office at No. 29 Chambers street, are offering to the trade an adjustable clapboard marker, the general features of which will be understood by reference to the cut of the engravings. This tool is so constructed that it can be used with one hand, while the other is used for holding a clapboard in position. The marking blade is properly slotted, so that the tool can be adjusted to any thickness of board. The sharp edge of the teeth on the marking blade are just parallel with the outer edges of the legs when placed against the corner-board. By moving the tool half an inch when in this position it will mark a

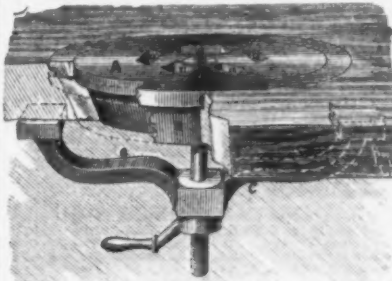


Adjustable Clapboard Marker.

full line across the clapboard, exactly over and conformed to the edge of the corner-board. By its use, therefore, there is no difficulty in sawing for a perfectly close joint.

Revolving Bench Plate.

The accompanying engraving represents an improvement in the equipment of tinners' benches which will be appreciated by all who admire labor-saving devices and who like to have things neat and handy about their work. It is the invention of Frank E. Thompson, of Elkhart, Ind., an experienced mechanic, and one who thoroughly understands the requirements of the tin-smith's work. The leading features of the



Thompson's Revolving Bench Plate.

article are readily gained by an inspection of the engraving. A ring is let into an opening cut in the bench for its reception. The outer edge is beveled, and an annular flange extending from its upper edge supports the ring and keeps it level, also prevents its dropping through the opening in the bench. The circular plate B is fitted within the ring, and its edge is beveled to correspond with the interior of the ring to prevent its dropping through and to keep it level, and to make a seat for it to revolve on. An annular flange projecting from its upper edge and seated in a corresponding rabbet in the ring affords a further support. The truss braces C C, made of one piece of metal, hold the ring and plate in position. It is of a length greater than the diameter of the lower outer edge of the ring, so it may get a purchase at each end on the bench on diametrically opposite sides of the opening. A bolt passed through the center of the plate B and truss is threaded on its lower end and provided with a hand-nut for drawing the parts in place and firmly holding the ring and plate in position. The plate B is preferably of a thickness equal to that of the ring, and is provided with a series of openings for the reception of the several tools, stakes, &c. The truss brace can be used to hold the plate on any thickness of bench. The holes in the plate are of a shape to adapt them to take in any of the stakes that are in common use, and also to hold stock shears and other tools employed by the sheet-metal worker. By means of the revolving plate tools can be turned in any direction without being removed. The article occupies a space of 8½ inches on the bench. An obvious advantage is that this device supercedes the large iron plate in common use, having a number of holes, and also the necessity of cutting holes along the edge of the bench. Its construction is such that it is simple, durable and complete.

A number of coal operators of the Shawnee, Ohio, coal districts have forwarded a petition to the State Commissioner of Railroads and Telegraphs, asking for relief from alleged unjust discrimination on the part of the Baltimore and Ohio Railroad. The operators claim that for weeks at a time no cars have been furnished some of their mines, and that from this cause they were

enabled to be worked only two days during the past month, thus inflicting great hardships and suffering upon their employees, who are solely dependent upon the working of the mines for their daily bread.

Submarine Boats.

Speaking of developments in the line of submarine boats the *Engineer* (London) supplies the following facts:

The idea of navigating a vessel under water dates back, as far as is known, to the reign of James I, when such a boat invented by a man named Drebbell was tried on the Thames. It is stated to have been propelled by oars, and the inventor had some liquid composition for purifying the air after use. In 1774 a man named Day appears to have devised a submarine vessel which went down with him in Plymouth Sound and was not recovered for some time after. About that time Bushnell, an American, was working at the same idea, and his design seems to be the first in which submarine navigation and torpedo warfare were combined. It consisted of a covered in wooden boat of great strength, but very limited size, so that when sealed up it only contained sufficient air to last one man half an hour. An air working in a water tight joint was used to propel the boat, which was also furnished with a rudder and compass. When desired to go below the surface, water was admitted by a valve. To ascend it had to be pumped out by hand, and in case of emergency external ballast could be detached. Her principal mission was to affix a torpedo to the bottom of a vessel, which would explode mechanically after a certain interval, or be ignited by means of an electric wire when the boat had retired to a safe distance. No success seems to have attended the operations of this boat, nor can it be wondered at under the above conditions.

Fulton, who was the first to establish steam navigation in America, then took up the subject while in France, and also endeavored to construct a locomotive torpedo. This was a failure, but his submarine boat was certainly an improvement on Bushnell's. It was larger, and carrying compressed air; the crew were enabled to remain under the water some hours. The motive power was defective, being obtained by means of a wheel worked by hand, and after a considerable number of experiments they were brought to an end by the inventor's early death.

It has been stated that submarine boats were employed by the Russians in the Crimean War; but we believe this was not the case, and that the explosions on their ships encountered were due to small stationary mines. About 1860 a submarine boat was built in France which showed a decided advance over her predecessors. Compressed air was utilized as motive-power in working an ordinary propeller, and also in expelling water admitted for submergence. A very important addition was a small horizontal screw on the upper part of the boat, the revolution of which regulated and assisted the boat's vertical movement under water. This, as will be seen presently, is the leading feature of the latest design. The armament of this French boat was a spar carrying a charge of powder. It is to be presumed, however, this boat was not altogether satisfactory, as a model was placed in the Paris Exhibition of 1867, and she does not appear to have had any successors. In the American Civil War submarine boats were employed with great bravery and pertinacity, as in most instances they caused the destruction of their own crews. They were primitive in design, the great object being rapidity of construction, and their equipment usually consisted of spar torpedoes. Submarine boats seem of late years to have occupied a great deal of attention in Russia. Between 1860 and 1870 experiments were carried out with one designed by a M. Alexandrovsky, in which compressed air was again the motive power. Other types have been tried since, but none seem to have been altogether satisfactory, and did not command sufficient confidence to be employed against the Turkish ships in the last war. Other designs of submarine boats have from time to time been brought forward, but space will not permit of their description, and they have in few cases got beyond the paper stage. We therefore pass on to more recent efforts which have attained sufficient success to warrant a belief that submarine navigation may become an important element in future naval wars.

About eight years ago a submarine boat was built at Liverpool from the design of a Mr. Garrett, the principal feature of which was the storage of chemicals to purify the air after use. In other respects this boat was too small for efficient service. A larger one was then constructed, in which steam replaced manual labor as the motive power. Some interesting experiments were made in her, but she was unfortunately lost off the Welsh coast. Mr. Nordenfeldt, the eminent maker of machine guns, then turned his attention to the subject, and has constructed a boat in which most of the defects exhibited by former designs have been corrected. In an interesting lecture delivered at the Royal United Service Institution last February, he gave a detailed description of his boats, and therefore we do not propose to give more than a bare outline of the chief points connected with their practical use. The first boat constructed was 64 feet long, propelled by an ordinary marine engine and screw; speed about 9 knots. At each end is an iron reservoir for hot water, so that when traveling beneath the surface further stoking is dispensed with, and the engines worked by the steam from the heated water in boiler and reservoir. This is stated to be sufficient for a run of over 12 miles. At each side of the boat is a horizontal screw worked by a separate small engine. The revolution of these propellers causes the boat to descend horizontally when its buoyancy has been sufficiently reduced by the admission of water to an iron tank. The reserve of buoyancy, therefore, brings the boat to the surface when the side screws are stopped. A reducing valve acted on by the pressure of the water is connected with the supply of

steam to the small engine, and so controls the depth to which the boat descends. A circular opening on top gives admittance to the interior, and has a thick glass water-tight dome over it, through which the helmsman can see to direct his course with an ordinary wheel and rudder. The boat is kept horizontal by means of bow rudders. When closed up there is sufficient air to supply three men for six hours without causing discomfort, and therefore Mr. Nordenfeldt has not supplemented this by any storage of compressed air or restorative chemicals. This boat was exhibited in Sweden before representatives of different countries, and the general opinion of her capacity seems to have been favorable. She was then sold to the Greeks early in the present year, who did not seem eager to practically test her qualities themselves, though in the presence of a committee Mr. Nordenfeldt's agent carried out the various conditions imposed. But the principal object of a submarine boat is to project a locomotive torpedo, and this boat having then no means of doing so, the Greeks desired this might be added before the purchase was concluded. Mr. Nordenfeldt's original idea seems to have been to have a tube on the outside of the boat forward, in which the torpedo should be placed, its discharge being effected when desired by simply admitting air to the engines. The torpedo would then propel itself out of the tube, to which the water had free access. This would, of course, entail some system of levers worked from the interior through a water-tight joint. We believe a tube was sent to Greece but proved too heavy, and we are unaware whether any ejecting arrangement has since been applied to her. There are several objections to any external fitting, besides involving a loss of speed and liability to damage. The best place would be to build the tube inside the stem, with an orifice similar to the bow discharge of the Polphemus, and it is a pity this did not form a portion of the original design. When we are told a locomotive torpedo is carried outside and discharged mechanically, we naturally ask what success has attended this plan; but up to the present we have not heard the result. Such experience, however, seems highly desirable, seeing that Mr. Nordenfeldt has built larger boats to carry two tubes in a similar manner.

On Greece obtaining the boat we have described, Turkey ordered two of the larger ones, which, we believe, have been delivered, and should be glad to know whether torpedo practice from them has been carried out. There is no doubt, however, Mr. Nordenfeldt has practically demonstrated that submarine boats are not impossible, though the fact of their being able to travel at a fixed depth below the surface for some hours does not constitute their principal merit. The difficulty of keeping an exact course under water has not been overcome. It can be kept approximately by compass, but not sufficiently accurate to allow such a boat to discharge a torpedo before coming to the surface to verify its position. By submerging the boat until only the glass dome is above the water she becomes almost invisible, and could thus approach with little chance of being observed. At night it would be impossible to detect her, owing to the absence of noise, sparks or escaping steam, even with the aid of the most powerful electric light. In this respect she has a decided advantage over the ordinary torpedo-boat, and her employment in this condition will, we believe, prove of greater value than any power of complete submergence.

Old Rails in Belgium.—The improvement in the value of old iron rails reported from the United States and elsewhere has been promptly responded to on the Continent, more eagerness having been displayed during the past few days to purchase lots offered by the Belgian Government for a long time past. Tardy & Benche, Savona, took 25,000 tons at about 60 francs, and for other parcels as much as 68 francs were given, while some German firms, whose offers arrived too late, were willing to purchase at 72 francs. Iron rails are stated to still constitute 35 per cent. of the total laid in Belgium, but almost all the main and fast-traffic lines are equipped with steel. The last purchase of iron rails by the State was in January, 1880.

Although less than 50 years have elapsed since Mr. Isaac Babbitt, of Boston, Mass., patented his renowned anti-friction metal, posterity has already economized in the spelling of his name by clipping off the final t. It is no uncommon thing to see his alloy advertised under the name of "Babbitt metal," and, in fact, many of the largest manufacturers of it, print the name in the garbled form. The omission of the t saves time and printers' ink, and if economy and not ignorance, is the cause of this vandalism, we suggest that the superfluous b be left out, or, in fact, why not save six letters at once and use simply the initial B, with a period after it? The least that can be done for a man deserving of fame is to transmit his name in its original form, but as no business interests are dependent upon the correct spelling of Mr. Babbitt's name, we doubt if any of the offenders we have in mind will go to the trouble of making the correction.

In a suit in Augusta, Ga., Mr. John Hill, a civil and mechanical engineer, who was employed several years ago to furnish plans for the building and machinery of the John P. King cotton mill, gave some interesting testimony as to the commissions offered by various manufacturing companies to induce him to buy their machinery. In nearly all cases, he said, in which he made "purchases," he received these individual commissions, aggregating over \$17,000, but that in every case he gave the King Mfg. Company the benefit of the commission. In some cases manufacturers insisted that they would not pay him the commission if the King Mfg. Company received the benefit, and would only pay it on condition that Mr. Hill would take the money and keep quiet. When necessary he consented to this, but turned over the money to the King Mfg. Company as soon as received.

Exports.

The following table presents the exports of Hardware, Iron, Steel, Metals, &c., from the port of New York, for the week ending January 4, 1887:

	Quan.	Val.		Quan.	Val.		
Dutch West Indies.			Cutlery, case.			6	241
Tinware, case.	10	\$111	Nails, box.	20	320		
Hdw., pkgs.	15	95	Iron, pkgs.	11	50		
Clocks, case.	10	106	Mf. iron, pkgs.	953	4,816		
Sew. ma., case.	8	79	Mach'y, pkgs.	95	3,906		
Mf. iron, pkgs.	12	93	Clocks, pkgs.	129	1,935		
Nails, kegs.	2	36	Nails, kegs.	472	998		
Danish West Indies.			Zinc caps, case.	1	30		
Pumps, pkgs.	1	22	Boiler tubes.	135	1,025		
Hdw., pkgs.	1	14	Stn. rails.	105	255		
Cartridge, case.	1	10	Tin, case.	5	32		
Bremen.			Tinware, case.	19	382		
Hdw., pkgs.	8	195	Cutlery, case.	81	972		
Sweepers, case.	1	30	Santander.				
Mf. iron, pkgs.	3	110	Hdw., case.	10	266		
Steel, bbls.	14	32	Havre.				
Hamburg.			Saws, case.	17	213		
Hdw., pkgs.	65	1,027	Mach'y, pkgs.	6	539		
Arms, case.	1	152	Mf. iron, pkgs.	84	510		
Clocks, case.	9	183	Ag. imp., pkgs.	86	4,531		
Sew. ma., case.	1	25	Hdw., case.	6	358		
Brass, case.	1	20	French West Indies.				
Mf. iron, pkgs.	1	22	Mf. iron, pkgs.	36	123		
Antwerp.			Sew. ma., case.	5	249		
Mf. iron, pkgs.	2	45	Tinware, case.	4	59		
Hdw., case.	16	228	Ag. imp., pkgs.	7	31		
Amsterdam.			Say Domingo.				
Hdw., case.	2	14	Hdw., case.	10	141		
Wringers, case.	2	60	Tacks, case.	1	18		
Copper cases.	111	13,875	Sealers, case.	5	157		
Stettin.			Mf. iron, pkgs.	836	1,392		
Ag. imp., pkgs.	36	695	Mach'y, pkgs.	2	171		
Gutenbergburg.			Anchors, &c.				
Mf. iron, pkgs.	2	48	pkgs.	3	48		
Hdw., case.	57	877	Nails, kegs.	19	18		
Clocks, case.	91	1,297	Tinware, case.	1	12		
Rotterdam.			Sew. ma., case.	2	56		
Ag. imp., pkgs.	5	240	Palermo.				
Pumps, pkgs.	12	240	Pumps, pkgs.	1	72		
Copper, case.	107	13,375	Revolvers, case.	1	345		
Wringers, case.	2	45	Naples.				
Clocks, case.	1	69	Mach'y, pkgs.	4	11,009		
Hdw., case.	38	539	United States of				
Mach'y, pkgs.	2	75	Colombia.				
London.			Mf. iron, pkgs.	355	5,379		
Mach'y, pkgs.	99	4,520	Cutlery, case.	137	2,227		
Pumps, pkgs.	7	395	Mach'y, pkgs.	574	13,776		
Hdw., case.	48	1,409	Tinware, case.	18	281		
Granite ware,			Cartridges, case.	5	158		
case.	2	133	Chain, lengths	2	55		
Sew. ma., case.	49	1,252	Clocks, case.	7	91		
Mf. iron, pkgs.	1	25	Pumps, pkgs.	6	149		
Steel, pkgs.	2	170	Zinc, drums.	2	96		
Hull.			Nickel tokens,				
Ag. imp., pkgs.	126	788	case, bbls.	10	210		
Sealers, case.	2	230	M. dust, bbls.	10	16		
Saws, box.	6	17	Brass gds, case.	3	237		
Hdw., case.	1	58	Solder, case.	2	81		
Cutlery, case.	1	80	Fountains, case.	4	102		
Mf. iron, pkgs.	7	339	Plumbing, bbls.	4	200		
Liverpool.			Gran. ware, case.	3	157		
Clocks, pkgs.	964	16,501	Anchors, &c.				
Sew. ma., case.	494	10,772	Q'silver, flks.	36	1,020		
Mf. iron, pkgs.	14	900	rdw., case.	306	3,095		
Pumps, pkgs.	1	21	Sew. ma., case.	38	818		
Wringers, case.	1	24	Nails, kegs.	24	136		
Hdw., case.	77	2,080	Firearms, case.	148	29,395		
Metal goods,			Iron, pkgs.	5	21		
pkgs.	14	1,117	Ag. imp., pkgs.	6	70		
Mf. steel, pkgs.	4	411	Wheels and a.				
Mach'y, pkgs.	23	3,197	pr.	2	67		
Lead, pkgs.	2	15	Wire cloth, case.	1	56		
Arms, case.	2	108	Mexico.				
Cop'r matte,			Sew. ma., case.	67	2,665		
sacks.	2586	12,500	Mach'y, pkgs.	11	705		
Ag. imp., pkgs.	53	1,521	Ag. imp., pkgs.	33	174		
Brazil.			Sealers, case.	3	64		
Mf. iron, pkgs.	4	80	Cartridges, case.	3	97		
Mach'y, pkgs.	5	970	Rifle, case.	1	25		
Hdw., case.	9	554	Nails, case.	2	16		
Glasgow.			Mf. iron, pkgs.	190	1,152		
Mf. iron, pkgs.	5	123	Hdw., pkgs.	135	1,953		
Sew. ma., case.	61	2,955	Pumps, pkgs.	10	132		
Cartridge, case.	1	20	Clocks, case.	10	132		
Ag. imp., pkgs.	14	800	Iron safe.	1	46		
Hdw., case.	48	1,464	Per cussion				
Clocks, case.	89	1,509	caps, case.	4	190		
Mach'y, pkgs.	3	877	Cutlery, case.	16	1,527		
Sew. ma., case.	33	1,508	Nails, kegs.	150	382		
British West Indies.			Copper case.	1	11		
Tinware, case.	27	443	Revolvers, case.	1	165		
Hdw., pkgs.	37	447	Tacks, case.	82	605		
Nails, case.	29	198	Haiti.				
Ag. imp., pkgs.	9	114	Sew. ma., case.	10	104		
Mf. iron, pkgs.	18	215	Nails, kegs.	106	275		
Tacks, case.	1	2	Nails, case.	60	81		
Cutlery, case.	8	134	Hdw., case.	15	447		
Sew. ma., case.	14	286	Tin, box.	15	84		
Nails, kegs.	152	530	Ag. imp., pkgs.	2	107		
Fountain, case.	1	10	Cutlery, case.	1	17		
British Guiana.			Shot, kegs.	2	24		
case.	1	31	Iron, pkgs.	8	25		
Cartridges, case.	2	66	Venezuela.				
Clocks, case.	6	89	Mf. iron, pkgs.	500	3,843		
Chokers, case.	7	135	Hdw., case.	57	523		
Sheath met.			Sawteeth, box.	1	81		
cases.	8	135	Revolvers, case.	1	345		
British Australia.			Tacks, case.	32	399		
Hdw., pkgs.	961	15,127	Cutlery, case.	3	90		
Ag. imp., pkgs.	58	1,791	Clocks, case.	2	21		
Saws, case.	57	2,334	Ag. imp., pkgs.	112	1,190		
Mf. iron, pkgs.	131	1,960	Brass goods,				
Car-wheels.	894	4,783	case.	1	4		
Air guns, case.	4	419	Mach'y, oil,				
Revolvers, case.	1	10	galls.	50	31		
Nails, kegs.	90	231	Spikes, kegs.	30	104		
Clocks, case.	31	325	Cartridges, case.	1	21		
Cartridge			Tinware, case.	12	364		
shells, case.	1	18	Sew. ma., case.	12	365		
W. mill mill,			Wat. closets.	2	91		
pkgs.	16	398	Nails, kegs.	2	5		
Pumps, pkgs.	30	963	Nails, case.	3	25		
Sew. ma., case.	539	10,071	Mach'y, pkgs.	36	459		
Nails, case.	75	563	Singra.				
Mach'y, pkgs.	55	6,329	Pumps, pkgs.	6	359		
Carriage matl.,			Porto Rico.				
pkgs.	310	5,547	Mf. iron, pkgs.	2	45		
Cartridges, case.	8		Mach'y, pkgs.	1	369		
Cutlery, case.	3	43	Pumps, pkgs.	5	525		
Tacks, case.	8	50	Genoa.				
Steel, box.	1	40	Engine.	1	900		
Guns, case.	1	35	Pumps, pkgs.	5	228		
Wire goods, case.	1	30	Hdw., case.	18	140		
British Possessions			Constantinople.				
in Africa.			Clocks, pkgs.	10	383		
Hdw., pkgs.	306	6,813	Central America.				
Ag. imp., pkgs.	283	4,771	Cutlery, case.	31	920		
Cartridge, case.	25	250	Mf. iron, pkgs.	115	341		
Mf. iron, pkgs.	62	240	Sew. ma., case.	3	99		
Pumps, pkgs.	2	91	Shot, boxes.	6	98		
Windmills.	6	830	Guns, case.	4	412		
Nails, kegs.	300	818	Lathe.	1	641		
British Honduras.			pumps, pkgs.	1	519		
Ag. imp., pkgs.	3	34	Hdw., case.	33	512		
Hdw., case.	1	36	Tinware, case.	16	221		
Mf. iron, pkgs.	8	41	Cartridges, case.	8	219		
Sew. ma., case.	11	139	Nails, kegs.	21	62		
Bordeaux.			Sopry, pkgs.	32	121		
Hdw., case.	5	165	Ag. imp., pkgs.	4	81		
Cartridge			S. cop. case.	1	272		
shells, case.	1	100	Livera.				
Cuba.			Hdw., case.	5	55		
Hlw., pkgs.	289	2,652	Nails, kegs.	17	51		
Gum printers,			Sew. ma., case.	45	169		
case.	2	400	Nails, case.	3	84		
Zinc, case.	1	44	Clocks, case.	2	85		
Sew. ma., case.	18	191	Brass kettles,				
Spikes, kegs.	34	58	cases.	3	308		
Tacks, case.	3	12	Japan.				
Wire goods, case.	1	408	Cartridges, case.	33	678		
Car-wheels,			Clocks, pkgs.	34	1,293		
pairs.	110	1,366	Hdw., case.	30	234		
Met. gds, case.	1	23	Sew. ma., case.	3	1,070		
Ag. imp., pkgs.	40	1,367	Cartridges, case.	7	62		
Pumps, pkgs.	9	553	Clocks, pkgs.	180	725		
Argentina Republic.			Pumps.	6	245		
			Tin, pkgs.	3	15		
			Cutlery, case.	4	135		
			Sew. ma., case.	32	119		
			Ag. imp., pkgs.	372	6,050		
			Mf. iron, pkgs.	245	2,377		

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[illegible]

\$50 AMERICAN GIANT DYNAMO \$50

Electro-Plating and Electrotyping Machines

IN ALL SIZES, FROM \$50 UPWARDS.

CHEAPEST
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Headquarters
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ESTABLISHED 1863, INCORPORATED 1881,
SOLE MANUFACTURERS AND PATENTEES.

WORKS: 538 to 564 W. Tenth St. OFFICE: 36 to 40 Eleventh Ave., New York, U. S. A.

WHOLESALE METAL PRICES, JANUARY 5, 1887.

METALS.

IRON.—Duty: Bars, 8-10¢ to 11-10¢ per lb. provided that no bar iron shall pay a less rate of duty than 35¢. Sheet, 11-0¢ to 15-10¢ per lb. Band, Hoop and Scrolled, 1¢ to 1-10¢ per lb. Railroad Bars weighing more than 25 lb. per yard, 7-10¢ of 1¢ per lb.

Standard American Pig Iron.

Foundry No. 1, 1¢ ton \$30.00 @ 21.00
Foundry No. 2, 1¢ ton 19.00 @ 19.50
Gray Forge, 1¢ ton 17.00 @ 18.00

No. 1 Scotch Pig Iron.

Carnegie, 1¢ ton \$19.50 @ 19.75
Coltman, 1¢ ton 21.00 @ 21.50
Shotts, 1¢ ton 19.50 @ 19.75
Hengarnock, 1¢ ton 19.50 @ 19.75
Gartshore, 1¢ ton 19.50 @ 19.75
Langdon, 1¢ ton 20.25 @ 20.50
Summerlee, 1¢ ton 20.00 @ 20.50
Dalmellington, 1¢ ton 19.25 @ 19.75
Edginton, 1¢ ton 19.00 @ 19.50
Clyde, 1¢ ton 19.25 @ 19.50

Rails.

Steel, at Eastern mills, 1¢ ton \$36.50 @ 37.00
Old Rails, 1¢ ton 25.00 @ 25.25

Scrap.

Wrought, 1¢ ton, from yard, \$22.50 @ 23.00

Bar Iron from Store.

Common Iron: 3/4 to 2 in. round and square, 1¢ lb 2.00 @ 2.10
1 to 6 in. x 3/4 to 1 in. 1¢ lb 2.20 @ 2.30

Refined Iron: 3/4 to 2 in. round and square, 1¢ lb 2.30 @ 2.50
1 to 6 in. x 3/4 to 1 in. 1¢ lb 2.40 @ 2.60

Rods: 3/4 and 1-1/2 in. round and sq. 1¢ lb 2.30 @ 2.50
Bands: 1 to 6 in. x 1/8 to 1/4 in. 1¢ lb 2.70 @ 2.90

"Burden's Best" Iron, base price 1¢ lb 3.25 @ 3.50
price, "H. B. & S." Iron, base price 1¢ lb 2.75 @ 3.00

Norway Rods, 1¢ lb 2.75 @ 3.00

Sheet Iron from Store.

Common American Cleaned

No. 10 to 16, 1¢ lb 2.75 @ 3.00
17 to 20, 1¢ lb 2.85 @ 3.10
21 to 24, 1¢ lb 2.95 @ 3.20
25 and 26, 1¢ lb 3.05 @ 3.30
27, 1¢ lb 3.15 @ 3.40
28, 1¢ lb 3.25 @ 3.50

Galvanized to 20, 1¢ lb 4.00 @ 4.50
Galvanized, 1 to 24, 1¢ lb 4.50 @ 5.00
Galvanized, 25 to 36, 1¢ lb 5.00 @ 5.50
Galvanized, 37, 1¢ lb 5.50 @ 6.00
Galvanized, 38, 1¢ lb 6.00 @ 6.50
American Russia, 1¢ lb 5.50 @ 6.00
Russia, 1¢ lb 5.00 @ 5.50
American Cold Rolled B. B., 1¢ lb 5.00 @ 5.50

Iron Wire.—(See Wire.)

STEEL.—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb., 2¢ per lb.; valued above 7¢ and not above 10¢ per lb., 3¢ per lb.; valued above 10¢ per lb., 3 1/2¢ per lb. Extra.—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1 1/2¢ per lb. in addition to above; Steel Circular Saw Plates, 1¢ per lb. in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

Chrome Steel.

Tool Steel, ordinary size, 3/4 to 3 inches, net, 10¢ @ 14¢

Adamantine Shoes and Dies, 14¢ @ 16¢

Magnet Steel

English Steel.

Best Cast, 1¢ lb 15¢ @ 16¢

Extra Cast, 1¢ lb 16¢ @ 17¢

Circular Saw Plates, 1¢ lb 17¢ @ 18¢

Swaged, Cast, 1¢ lb 18¢ @ 19¢

Best Double Shear, 1¢ lb 19¢ @ 20¢

Blister, 1st quality, 1¢ lb 20¢ @ 21¢

German Steel, Best, 1¢ lb 21¢ @ 22¢

2d quality, 1¢ lb 22¢ @ 23¢

3d quality, 1¢ lb 23¢ @ 24¢

Sheet Cast Steel, 1st quality, 1¢ lb 24¢ @ 25¢

2d quality, 1¢ lb 25¢ @ 26¢

3d quality, 1¢ lb 26¢ @ 27¢

TIN.—Duty: Plates, Sheets, Tagger and Terne, 1¢ lb 1¢ @ 1 1/2¢

1¢ lb 1 1/2¢ @ 1 3/4¢

Banca, 1¢ lb 23¢ @ 24¢

Strains, 1¢ lb 24¢ @ 25¢

English, 1¢ lb 25¢ @ 26¢

Har, 1¢ lb 26¢ @ 27¢

Charcoal Tin Plates.

1 C 10x14 25 sheets, 1¢ box \$5.00 @ 5.25

1 C 12x18 25 sheets, 1¢ box 5.00 @ 5.25

1 C 20x25, 112, 1¢ box 10.25 @ 10.75

1 X 10x14 25 sheets, 1¢ box 6.00 @ 6.25

1 X 12x18 25 sheets, 1¢ box 6.00 @ 6.25

1 X 14x20, 112, 1¢ box 6.00 @ 6.25

1 C 10x14 112, 1¢ box 5.00 @ 5.25

1 C 12x18 112, 1¢ box 5.00 @ 5.25

For each additional X add, 1.25 @ 2.25

Coke Tin Plates.

Best. Ordinary.

1 C 10x14, 1¢ box \$4.50 @ 4.75

1 C 12x18, 1¢ box 4.75 @ 4.90

1 C 10x14, gutters, 25 sheets, 6.00 @ 6.25

1 C 10x14 112 sheets, 9.00 @ 9.50

Terra Plates.

Prime Char. 3d. quality

1 C 14x20 M.F. \$6.50, 1¢ box \$13.25

1 C 14x20 Old Process, 1¢ box 13.25

1 C 20x25, 1¢ box 13.25

1 C 14x20, 1¢ box 4.75 @ 4.90

1 X 14x20, 1¢ box 4.75 @ 4.90

1 C 20x25, 1¢ box 8.75 @ 8.90

1 X 20x25, 1¢ box 8.75 @ 8.90

Tin Boiler Plates.

1 X 14x20, 2 sheets for No. 7, 112 sheets, 1¢ box \$12.00

1 X 14x20, 2, 1¢ box 13.00

1 X 14x20, 2, 1¢ box 13.00

COPPER.—Duty: Pig, Bar and Ingot, 4¢ per lb. Manufactured (including all articles of which Copper is a component of chief value), 35¢ ad valorem.

Ingot, Lake, 1¢ lb 13¢ @ 13 1/2¢

Ingot, Baltimore, 1¢ lb 10 1/2¢ @ 11¢

Ingot Anchor, 1¢ lb 11 1/2¢ @ 12¢

Cold Rolled Sheet.

16 oz. per square foot, and heavier, 1¢ lb 19¢ @ 21¢

14 oz. and 15 oz. per square foot, 1¢ lb 21¢ @ 22¢

12 oz. and 13 oz. per square foot, 1¢ lb 23¢ @ 24¢

10 and 11 oz. per square foot, 1¢ lb 24¢ @ 25¢

Tinning.

Sheets, one side, 10, 12 and 14 x 48, each, 5¢

Sheets, one side, other sizes, 1¢ square foot 2¢

For tinning both sides, double the above prices.

For tinning boiler sizes, 9 in., 14 x 60, each, 15¢

For tinning boiler sizes, 7 in., 14 x 56, each, 15¢

For tinning boiler sizes, 7 in., 14 x 52, each, 15¢

Sheathing Copper. (14 x 48.)

Hot Cold. Rolled. Rolled.

16 oz. to sq. ft. and heavier, per lb. 15¢ @ 16¢

14 oz. and up to 16 oz., per lb. 16¢ @ 17¢

12 oz. and up to 14 oz., per lb. 17¢ @ 18¢

Tinning, 6 cents each.

Copper Bottoms.

Pits and Flats, 14 oz., 1¢ lb 21¢ @ 22¢

Pits and Flats, 12 oz., 1¢ lb 22¢ @ 23¢

O'Neill's Patent Planished Copper, Net, 14x50

14 and 16 oz. and heavier, 2¢ By the case, 1¢ lb 30¢ @ 32¢

12 oz. and lighter, 1¢ lb 24¢ @ 26¢

Boiler Sizes.

7 in., 14x50, 8 in., 14x56, 9 in., 14x60, and 16 oz. and heavier, 2¢ By the case, 1¢ lb 30¢ @ 32¢

And all sizes not over 20 in. wide.

and 16 oz. and heavier, 1¢ lb 31¢ @ 32¢

os, 1¢ lb 34¢ @ 35¢

Planished Brass same price as Planished Copper

Copper Wire.—(See Wire.)

Yellow Sheathing Metal, 1¢ lb 18¢ @ 19¢

BRASS AND GERMAN SILVER.

A room & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire; Use Manufacturers' Price List, January 17, 1886, as basis.

LEAD.—Duty: Pig, 3¢ per 100 lb; Old Lead, 4¢ per 100 lb; Pipe and Sheet, 3¢ per lb.

Pig, 1¢ lb 4¢ @ 4 1/2¢

Bar, 1¢ lb 4 1/2¢ @ 4 3/4¢

Pipe, 1¢ lb 4 3/4¢ @ 4 1/2¢

Block Tin Pipe, 1¢ lb 4 1/2¢ @ 4 3/4¢

Tin Lined Pipe, 1¢ lb 4 3/4¢ @ 4 1/2¢

Sheet, 1¢ lb 4 1/2¢ @ 4 3/4¢

Shot, 1¢ lb 25¢ @ 26¢

Chilled Shot, 1¢ lb 25¢ @ 26¢

Drop, \$1.60; Buck, \$1.85

Chilled Shot, 1¢ lb 25¢ @ 26¢

Antimony, 1¢ lb 7¢ @ 8¢

Cooking, 1¢ lb 7¢ @ 8¢

SPELTER.—Duty: Pipes, Bars and Plates, \$1.50 per 100 lbs.

American, cash, 1¢ lb 4 1/2¢ @ 4 3/4¢

Bergport, 1¢ lb 4 1/2¢ @ 4 3/4¢

ZINC.—Duty: Pig or Block, \$1.50 per 100 lbs.

Sheet, 1¢ lb 5 1/2¢ @ 5 3/4¢

600 lb casks, 5 1/2¢ @ 5 3/4¢

Zinc—Open, 5 1/2¢ @ 5 3/4¢

Zinc Tubing—Dis. 25¢.

Plain, 1¢ lb 27¢ @ 28¢

Fancy, 1¢ lb 28¢ @ 29¢

Scotch and Extra Fancy, 8 and 9, 1¢ lb 28¢ @ 29¢

RABBIT METAL, 1¢ lb 6 1/2¢ @ 6 3/4¢

X, 1¢ lb 10¢ @ 10 1/2¢

X X, 1¢ lb 10 1/2¢ @ 10 3/4¢

WIRE.

Market Wire.—Put up in 63 lb bundles.

Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

10 11 12 13 14 15 16

Bright Market Wire, 1¢ lb 6 1/2¢ @ 6 3/4¢

Charcoal, 1¢ lb 4 1/2¢ @ 4 3/4¢

Bale Wire, Nos. 7 to 12, 1¢ lb 6 1/2¢ @ 6 3/4¢

Annealed Market Wire, 1¢ lb 6 1/2¢ @ 6 3/4¢

Fence Wire, Nos. 8 and 9, 1¢ lb 6 1/2¢ @ 6 3/4¢

Grape Wire, Nos. 10 to 14, 1¢ lb 6 1/2¢ @ 6 3/4¢

Coppered Market Wire, 1¢ lb 6 1/2¢ @ 6 3/4¢

Bale Wire, Nos. 7 to 12, 1¢ lb 6 1/2¢ @ 6 3/4¢

Galvanized Market Wire, 1¢ lb 6 1/2¢ @ 6 3/4¢

Fence Wire, 1¢ lb 6 1/2¢ @ 6 3/4¢

Stone or Weaving Wire.

Nos. 16 17 18 19 20 21 22 23 24 25 26

Cents, 14 15 16 17 18 19 20 21 22 23 24 25 26

Nos. 27 28 29 30 31 32 33 34 35 36

Cents, 28 29 30 31 32 33 34 35 36 37 38 39 40

Nos. 16 to 18, 1¢ lb 20¢ @ 21¢

27 to 36, 1¢ lb 20¢ @ 21¢

Galvanized Stone Wire, 1¢ lb 20¢ @ 21¢

Cast Steel, Steel Wire list, 1¢ lb 50¢ @ 51¢

Old English Gauge the Standard.—Dis. 40¢ @ 25¢.

Brass and Copper Wire.

Common High Low Bronze and Copper.

All Nos. to No. 16, 1¢ lb 30¢ @ 31¢

No. 17 and 18, 1¢ lb 31¢ @ 32¢

" 19 and 20, 1¢ lb 32¢ @ 33¢

" 21, 1¢ lb 33¢ @ 34¢

" 22, 1¢ lb 34¢ @ 35¢

" 23, 1¢ lb 35¢ @ 36¢

" 24, 1¢ lb 36¢ @ 37¢

" 25, 1¢ lb 37¢ @ 38¢

" 26, 1¢ lb 38¢ @ 39¢

" 27, 1¢ lb 39¢ @ 40¢

" 28, 1¢ lb 40¢ @ 41¢

" 29, 1¢ lb 41¢ @ 42¢

" 30, 1¢ lb 42¢ @ 43¢

" 31, 1¢ lb 43¢ @ 44¢

" 32, 1¢ lb 44¢ @ 45¢

" 33, 1¢ lb 45¢ @ 46¢

" 34, 1¢ lb 46¢ @ 47¢

" 35, 1¢ lb 47¢ @ 48¢

" 36, 1¢ lb 48¢ @ 49¢

" 37, 1¢ lb 49¢ @ 50¢

" 38, 1¢ lb 50¢ @ 51¢

" 39, 1¢ lb 51¢ @ 52¢

" 40, 1¢ lb 52¢ @ 53¢

Spring Wire, 2 cents per pound advance

White Wire, 3 cents per pound advance

Flat Square and Half-Round Wire, 4 cents advance on Round Wire

Fancy Wire, not less than 10 cents advance on Round Wire

Spooling on one-pound Spools, 12 cents per pound extra

Spooling on ten-pound Spools or more, 2 cents per pound extra

MISCELLANEOUS TINNERS' STOCK.

1/4 & 1/2. Warranted, 1¢ lb 15¢ @ 15 1/2¢

Extra, 1¢ lb 16¢ @ 16 1/2¢

No. 1 Refined, 1¢ lb 17¢ @ 17 1/2¢

No. 2 Solder, 1¢ lb 18¢ @ 18 1/2¢

MANUFACTURING.

Iron and Steel.

Carnegie Bros. & Co., of Pittsburgh, have decided to erect a new rail mill at Braddock, near their Edgar Thomson Steel Works. A member of the firm stated last week that work on the proposed mill will be started the present month. It is to cost about \$1,000,000. It is intended to introduce a new manufacturing process in the mill, which will cheapen the cost of production considerably. We understand that the mill will be continuous. An increase of business is the chief cause for erecting the new plant. At present the converting capacity of the company is greater than their rolling facilities. The company has also more orders on hand than the Braddock and Homestead mills can supply. When the addition to the company's works is made there will then be sufficient rolling power to use up all the product of the converting mill. The completion of the mill will make the Edgar Thomson Steel Works the largest in the world. Carnegie Bros. & Co. will then have capacity to turn out 400,000 tons of rails annually, or nearly one-third of the total output in the United States.

Mr. Percy Preston has been admitted as a member into the firm of H. E. Collins & Co., brokers and dealers in ores and metals, at 34 Lewis Block, Pittsburgh, Pa.

The Junction Iron Company, of Wheeling, W. Va., inform us that they blew in their new furnace, erected for them by Gordon, Strobel & Laurean, Limited, of Philadelphia, on the 1st inst. It is 75 x 18, and will produce about 125 tons of pig iron daily. The above company have been running the nail department of their works double turn since June of last year, making 2500 kegs of steel nails every 24 hours. Owing to the light supply of gas the night turn has been taken off in the nail department to allow the company to run its Bessemer plant night and day, which is now being done. This department is at present producing 300 tons daily of Bessemer steel slabs and billets.

The muck department of the Benwood Iron Works, at Wheeling, W. Va., started up last week after a long idleness. Thirty furnaces were put on double turn, which, in addition to roll hands and other men employed about the department, gives employment to 200 men.

The North Chicago Rolling Mill Company's plant at North Chicago, which closed down for repairs a short time ago, will start up again in a few days.

The report that Cleveland parties were about to start up the Mountville Rolling Mills at Mountville, W. Va., which have been idle for 10 years, is without foundation.

The new works of the Fowler Steel Car Wheel Company, at Stony Island, have been completed. The main building is under cover, and the huge 60-ton machine which is to roll the wheels has been brought from Pittsburgh, where it was recently finished, and set up in the works. Mr. Hervey V. Fowler, the inventor, states that he expects to have his engines up and under steam some time in February. —*Industrial World, Chicago.*

Frank Firmstone, who has been superintendent of the Glendon Iron Company's furnaces, at Easton, Pa., since the death of his father a number of years ago, has resigned his position and will shortly leave for the West Indies to recuperate his health, which has been seriously impaired by overwork. Mr. Janney, of Pottsville, has accepted the position thus made vacant, and will at once assume charge of the furnaces.

Robert C. Brown, the treasurer of the Fall River Iron Works, Fall River, Mass., confirms the reports of the indefinite closing of the works. The west and middle portions of the mill are not running, and the east end will shut down as soon as the stock has been worked up. There is plate enough to keep the mill running about a month. Unless other capitalists take hold of the property, there will be no work for the employees after next week.

Schall, Stacey & Denney, proprietors of the York Rolling Mill, at York, Pa., have posted a notice in their works announcing an advance of 25 cents per ton for puddling iron. The price paid, heretofore was \$3.75 per ton.

The machinery in the new plate and Bessemer mill of Carnegie, Phipps & Co., at Homestead, near Pittsburgh, now being erected, will be finished and ready for work by the 1st of April.

No. 1 furnace of the Reading Iron Works, at Reading, Pa., which has been idle for about two years, has recently undergone extensive repairs, and will be blown in shortly. When this is done the combined output of both furnaces of the above company will be about 1000 tons per week.

Chess, Cook & Co., of Pittsburgh, who have been engaged in the manufacture of iron nails for years, are making preparations to manufacture steel nails exclusively, and will commence operations in a few days. The entire nail department is being remodelled, with a view to the necessary change in material used.

The Standard Iron Company, of Bridgeport, Ohio, are now making principally corrugated and roofing iron, and have capacity for turning out 30 tons of light sheet iron per day. This capacity will shortly be increased by the erection of a new three story building 55 x 144 feet in dimensions. It will be equipped with the very finest machinery and appliances, a steam elevator and other modern improvements, and will enable them to paint and corrugate their entire output. The president of the company is L. S. Delaplain and the secretary is H. T. Graham.

The proposition of Wood, Morrell & Co. to the employees of the Cambria Iron Company, at Johnstown, Pa., to convert their establishment into a co-operative store has been accepted, and articles of agreement and by-laws of the concern have been made, and books for subscription will be opened in

a few days. The store will be known as the Johnstown Co-operative Store, Limited. James McMillen is chairman, Joseph H. Berlin, secretary, and Francis Henderson, treasurer. Trustees have been selected for the first year. The stock is limited to their employees. The present stock is to be taken at an appraised value, the rent of the buildings not to exceed 6 per cent. of their value. Ten per cent. of the profits are to be set aside as a reserve fund until it amounts to one-fourth of the capital, which is \$2,000,000. Dividends not to be less than 6 nor more than 10 per cent.

The Swindell Construction Company, of Pittsburgh, have just closed a contract with the Columbia Iron and Steel Company, of Uniontown, Pa., for the erection of a soaking pit furnace, a large beam-mill furnace, two small beam-mill furnaces and 10 coal-gas producers. The contract will be finished about the 1st of April.

The Etna Iron and Steel Company, of Bridgeport, Ohio, closed down their works temporarily on the 21st inst., because of the resignation of the mill manager and his two assistants. As soon as a new force is organized to superintend the mechanical department of the works, and certain necessary repairs are completed, the mill will resume operations. It was thought the stoppage will not extend beyond the present week.

The Elba Iron and Bolt Company, of Pittsburgh, under date of December 31, informs us that they have leased the Eagle Rolling Mills in that city, formerly operated by J. W. Friend & Co. They expect to have the works in operation about the 5th inst, and will manufacture about 50 tons of muck bar per day, which will be used in the Elba works. The mill will employ about 150 men, and will be under the management of T. B. Everson, the present manager of the Elba Company. Natural gas will be used for fuel, the connections having already been made.

The puddling department of the Riverside Iron Works, at Wheeling, W. Va., which have been idle for two years, resumed operations on the 3d inst. They will give employment to about 600 men.

The large works of the Moorhead-McCleane Company, at Pittsburgh, were closed down last week for the purpose of taking stock and making repairs. They will commence operations again about the 15th inst. The report published in the Pittsburgh papers to the effect that the above company have purchased a large tract of land adjacent to their works and would erect a blast furnace and armor-plate mill is without foundation. No such purchase has been made.

Wallace, Banfield & Co., Limited, of Pittsburgh, proprietors of the Ironside Rolling Mills, at Ironside, Jefferson County, Ohio, have recently erected a new mill in connection with their works for the manufacture of fine sheet steel. It commenced operations last week, and will have a capacity of about 2000 tons per year.

J. P. Witherow, of Pittsburgh, whose works are located at New Castle, Pa., has leased the shops of the Cunningham Foundry and Machine Company at that place for one year, with the privilege of renewing for five years. Mr. Witherow will start these shops about January 1, and will give employment to 50 additional hands.

The Bouton Foundry Company, of Chicago, have constructed a new and extensive plant at the corner of Archer avenue and Quarry street, in that city, and expect to be in running order a little after the first of the year.

Stacks Nos. 2 and 3 of the Carbon Iron Company's furnaces, at Parryville, Pa., are in blast, and No. 1 is being gotten ready to start up as soon as possible. A salamander which formed in the bottom of the stack is being blasted out. It is expected to finish this by the 1st of January, when the bricklayers will begin the work of relining.

The November production of the Bethlehem Iron Company, of Bethlehem, Pa., was the largest in its history.

A Bessemer steel plant is to be erected at Sharon, Pa., by D. J. Egan and others.

The sale of the Everett furnace, in Bedford County, Pa., which was advertised to take place on December 15, has been postponed until January 12.

The Norton Iron Works, of Ashland, Ky., are receiving bids for the erection of a Bessemer steel plant to consist of two 3 ton converters.

There is a project on foot to establish a plant, consisting of blast furnaces and Bessemer mills at Duluth, where ore is cheaper, and where, it is claimed, coal can be delivered at about the same cost as at Chicago.

The Montgomery Iron Works, at Montgomery, Ala., contemplate adding a nail factory to their plant.

The Waterbury Farrell Foundry and Machine Company, of Waterbury, Conn., have recently added another boiler at their foundry. The Grinnell automatic sprinklers have also been put in. Ten years ago there were 70 men at work at this foundry; now there are 190.

Machinery.

The Jarvis Engineering Company, of Boston, has been awarded the contract for setting a new tubular boiler by the Woburn Water Works. They will use the Jarvis boiler setting.

Something over a year ago the extensive works of the Howe Sewing Machine Company, at Bridgeport, Conn., were closed, and have since lain idle. There has just been formed in that city a corporation to be called "The New Howe Manufacturing Company," which, having purchased the machinery, tools, fixtures, patents, finished parts, &c., of the old company, will shortly commence the manufacture of sewing machines, (the New Howe and D. Machine's) special machinery, tools, drop presses, &c., to order. The new company includes Mr. E. Farmlly, who was 17 years with the old company, and a long time its manager; Mr. Farmlly will be secretary and treasurer of

the new company. Mr. John P. Kennedy, of New York, is president. Included in the present company are also Mr. Frederick Billings and W. N. Coler, Jr., of New York; A. D. Ayres, of Chicago; Jas. Staples, Frank Armstrong, Henry R. Parrott, of Bridgeport, and others. The factory superintendent is to be Mr. E. Flathers, of Bridgeport. They will occupy of the Howe plant the large foundry, 237x75 feet; the machine room, 155x55 feet; annealing, case hardening and forging room, 100x40 feet, and a four story building, 155x55 feet. A 60-horse-power boiler of the Hazelton pattern is going in, and a 75 horse-power Corliss engine will follow. It is expected to start up work in the foundry January 15, and follow with the other departments a few days later. Probably 200 men will be employed at the start, and this number increased later.

At the machine shops of F. D. Buttricks, at New Haven, Conn., there are now being finished two 150 horse-power engines for the Harlem Electric Light Company, at Harlem, N. Y.

The Wainwright Mfg. Company, Boston, report the following sales of their feed-water heaters for the month of December: The Becket & McDowell Company, N. Y. (two orders); F. S. Kazenback & Co., Trenton, N. J.; McConway, Farley & Co., Pittsburgh, Pa.; John Dunlap & Co., Philadelphia, Pa.; C. W. Lyman, Somerville, Mass.; Geo. F. Blake Mfg. Company, Boston, and a fourth order from the Cumberland & Presumpscott Mills, Cumberland Mills, Maine. They have also made shipments of their corrugated expansion joints, filters, radiators, &c., and have been kept busy in their pipe and fitting department.

The Louisville Machine and Elevator Works, of Louisville, Ky., write us, under date of December 30: "We have a number of elevators under way and nearly completed, and orders for others coming to us from the surrounding section of country. We have lately purchased the Billings & Co. foundry, adjacent to our machine shops, which we are working at an increased capacity. We have also added largely to our machine works in the way of new and improved machinery, tools, &c., thus enabling us to complete work as promptly as we always desire to do. In our Louisville Boiler and Sheet Iron Works we are also quite active, working full turn and quite a number of contracts on hand. Our general manufacturing in machine shops has been large and satisfactory, and the year just closing will show a very large increase in all lines of our business."

The Bridgeport Forge Company, of Bridgeport, Conn., have recently made an addition 100 x 60 feet to their hammer shop. This is the fourth addition which has been made in this department since their start in business but a few years since. In this time there have also been made additions to the blacksmiths' shop twice, and to the machine shops three times.

The Manchester Locomotive Works, of Manchester, N. H., are about to increase their working force from 300 to 500. They have orders that will keep them busy until July.

The Vulcan Iron Works, of Chicago, has been awarded the contract by the city of Chicago for the construction of the steam engine and accompanying turning mechanism for the new bridge at State street. The company have also received orders for a pile-driver for the Colorado Midland Railway Company; a car-pile-driver for the A. T. & S. F. Railway Company, and a steam pile-driver for Messrs. McGowan & Son, of Astoria, Oregon.

The Pittsburgh Locomotive Works, of Pittsburgh, have more orders on hand at present than at any time for years.

Bradlee & Co., of the Empire Chain Works, Beach and Otis streets, Philadelphia, write us that since moving into their new works they have been very busy. Their work is principally of the heavier class. They fit out all the steamers built by Messrs. Cramp, Roach, Hanlan & Hollingsworth and others with cables and anchors. They are now under contract with Mr. Cramp for this material for the steamer Herman Winter, and the other steamer he is building for the Plant System, having just delivered the cables for Clyde's two steamers, Cherokee and Seminole. They furnished also a marine railway chain for the Wood Mfg. Company, of New Jersey, made of 2½-inch round iron, 700 feet long, weighing 50,000 pounds, and capable of drawing out the largest vessels that come to our ports. They are also making the cables and anchors for the steamer building at Neale & Levy's, Philadelphia. In addition to this work they are very busy on crane chains and D. B. G. special crane chains ¾-inch up to 1½-inch for the Morgan Engineering Company, Alliance, Ohio, the Farrell Foundry, Ansonia, Conn., the Bucyrus Foundry, Bucyrus, Ohio, and the United States Engineer Corps, and prospects are very good for the coming year.

The Universal Radial Drill Company, Cincinnati, Ohio, report the year just closing has been the busiest in their history. They have made additions to and improvements in their plant, revised methods and improved the quality of their product. They have added to their line this year two new radial drills, viz.: No. 00 with 4½ feet radius of arm, and No. 3 with 8 feet arm.

We learn that the "Suction Ties" manufactured by Watson and McDaniel, referred to in a recent issue, are to be used in the five new war vessels to be built for the Government. The Pennsylvania Railroad have adopted them in their Broad street Station at Philadelphia.

W. R. Eynon, Cleveland, Ohio, manufacturer of machine tools, has been compelled to move his shop to more commodious quarters.

Alfred Box & Co., of the Northern Liberty Works, Philadelphia, have recently added to their chain and sprocket-wheel department tools for heavy chain making for marine railways, and they have just completed the second railway order. They are

now prepared to take orders for all sizes of chain and wheels, using chain up to 2½ inches in diameter, and down to ½.

The Hinkley Locomotive Company, Boston, are busy upon 10 six-wheel 17 x 24 switching engines with 51-inch driving wheels for the Atchison, Topeka and Santa Fe Railroad.

With recent additions the Felber Machine Works, of St. Louis, Mo., embrace a plant of 13,000 square feet of ground. Since the death of the former proprietor, on September 4th last, the name has been slightly changed to read as above instead of reading as formerly, the George Felber Machine Works. Mr. Tillman Puetz, for years the foreman, is proprietor and operator of the works.

The Harrisburg Car Manufacturing Company, of Harrisburg, Pa., have received an order from the Pittsburgh and Western Railroad for 250 freight cars.

The E. E. Josef Mfg. Company, of Buffalo, N. Y., inform us that their last year's business was very fair, and that this year opens up encouragingly, with a fair number of orders on hand. Their specialty is designing and building tools and machines for the manufacture of specialties. They also make metal patterns, models and dies. They are now preparing drawings of car wheels and pulleys for shafting of sheet steel, constructed on a new plan.

Hardware.

C. R. Heizmann, A. A. Heizmann, Theodore I. Heizmann and James A. O'Reilly have purchased the entire butt works of the Perin and Gaff Mfg. Company, Jeffersonville, Ind. The new company will be known as the Penn Butt Works, and will be operated in connection with the Penn Hardware Works, of Reading, Pa. The buildings formerly occupied by the Penn Hardware Company are being put in order, new additions being erected and everything put in shape for the reception of the machinery, &c., which is expected to arrive about January 10. The new works will go into effect about January 20, and will employ from 75 to 100 hands.

Foster, Merriam & Co., manufacturers of furniture hardware, at Meriden, Conn., have recently erected a new building, to receive an additional boiler of 40 horse power and an 80 horse-power engine.

The Freeman Wire Company, of St. Louis, recently added four barb machines to their plant, and are now putting in two new staple machines. They are running day and night turns on orders taken at advanced prices.

The Indurated Fiber Company, Lockport, N. Y., advise us that they have received a communication from the secretary of the Fertilizers' Manufacturers Mutual Fire Insurance Company, of Baltimore, in regard to their Indurated Fiber Pails, in which he states that during the recent severe frost in that section their buckets stood the weather test much better than the ordinary metal buckets used, and their adaptability for use as fire pails is accordingly referred to.

Miscellaneous.

It is announced that after February 1 the Wheeling Natural Gas Company, of Wheeling, W. Va., will begin the payment of 1 per cent. a month dividends.

The Elson Glass Company, of Martins Ferry, Ohio, declared a cash dividend of 5 per cent. last week.

The Windsor Glass Works, at Homestead, Pa., near Pittsburgh, started up on the 3d inst., after an idleness of several weeks.

The stock for the proposed new Encaustic Tile Works, to be located at Beaver Falls, Pa., has all been taken, and a committee of the newly formed company is now engaged in prospecting for an eligible site. It is understood that the works will start up early in the spring.

Two large boilers in J. F. Seiberling & Co.'s Engine, Mower and Reaper Works, at Akron, Ohio, burst on Friday, wrecking a large portion of the extensive factory, killing three men and terribly wounding four others, besides injuring fully 50 more. This is the shop that has been under boycott for a year past, and various stories are out this evening as to the cause of the explosion. Lincoln Long, temporary engineer, says that he had just left the building when the explosion took place and was not hurt. He says he had but 90 pounds of steam and that the boilers were two thirds full of water. The loss to the factory is fully \$30,000. An investigation as to the cause will be demanded.

The Mount Auburn Cable Railroad Company, of Cincinnati, have contracted with Broderick & Bascom, of St. Louis, for a cable 1½ inches in diameter, weighing 2½ pounds to the foot, or a little over 52 tons altogether, for 8 miles of track. The Cincinnati contractor has completed about one-third of the contract for the castings, and the contractors in Dayton and Springfield are also busy with their work.

A telegram from Reading to the Philadelphia Ledger says of the condition of the iron ore miners in Berks and Lehigh counties: "A more hopeful condition of affairs exists at the beginning of this winter than for years past among the iron ore miners along the East Penn Railroad in Berks and Lehigh counties, where in previous cold seasons so much destitution and suffering were reported. While in other winter seasons nearly all the mines were idle, throwing 1500 miners upon whom 4000 persons depended for support, out of work, fully one-half of the mines are working now, and in place of the wages being as low as 50 to 70 cents per day, miners are now getting 90 cents, \$1, and \$1.10 per day."

The Florence iron ore mine, Florence, Wis., has been purchased by a syndicate of capitalists, most of whom are connected with the Brier Hill Iron and Coal Company, of Youngstown, Ohio. Operations will be conducted under the name of the Florence Mining Company. The officers of the company are as follows: Henry Tod, president; J. G. Butler, Jr., vice-president; John S.

Ford, secretary; J. N. Porter, general manager; Otto C. Davidson, superintendent; directors, John Stambaugh, Robert McCurdy, John S. Ford, Henry Tod, J. G. Butler, Jr.

The Bridgeport Copper Company, of Bridgeport, Conn., are adding to their plant a new building about 100 x 60 feet; they are also increasing their furnaces in the refining department by two more. This company will also probably build a new rolling mill.

John Q. Everson and others, of Pittsburgh, are organizing a company for the purpose of starting a new industry in that city. The object is to utilize blast-furnace slag for mortar and other building purposes.

The Low-Pressure Gas Company, of Allegheny County, with a capital stock of \$5000, was chartered last week. The boroughs to be furnished with gas are Knox, West Liberty and West Liberty. A charter was also granted to the Tarentum Light and Heat Company. The capital stock is \$15,000. The company proposes to mine for and produce natural gas in East Deer, Fawn and Harrison townships, Allegheny County.

Mitchell & Gayner, who removed from Waterbury to Bridgeport recently, are ready to commence the manufacture of light brass goods, and will probably start in with 15 or 20 hands, increasing as more help is needed. It is said that Bridgeport parties have offered to take \$50,000 to \$75,000 in stock and that the offer was declined.

The receivers of the Philadelphia and Reading Coal and Iron Company give notice that they will purchase on and after January 10 the interest on Brady, Gray and Wetherill, and on the Mount Carmel Locust Mountain Coal Company coal tracts at 6 per cent.; the interest on the St. Clair and Locust Mountain Summit Improvement Company and the Catharine Groh tracts at 5 per cent.; and on the Tamaqua, Minersville, Diamond, Coal Hill, Guntal and Branharn and Valley Furnace tracts at 4 per cent.

The National Gas Company, of Washington, Pa., were chartered on the 30th ult. The capital is \$10,000, and among the places to be supplied by the company are Pittsburgh and Allegheny. The stockholders are Oliver P. Scaife, Charles C. Scaife, William G. Park, D. E. Park and W. McCandless, of Allegheny.

The Shauer Gas-Coal Company, which were organized in Pittsburgh recently with a capital stock of \$250,000, will shortly open a mine in Pottsville, near Guilley Station, on the Baltimore and Ohio Railroad. The railroad company will build a track from the main line to the mine. Fifty double houses for the accommodation of the miners will be built at once.

It is stated that a number of capitalists in Denver, Col., are organizing a company in that city for the purpose of starting a flint glass factory of large dimensions.

Ripley & Co., glass manufacturers, of Pittsburgh, have moved into their new office on the corner of Eighth and Bingham streets. The building is one of the finest of the kind in Western Pennsylvania.

The railroad shops at Lamokin Station, near Chester, Pa., are soon to be put in operation by a corporation known as the Crown Smelting Company.

The Board of Arbitrators, engaged in endeavoring to adjust differences existing between the coal miners and operators in the Mahoning Valley, Ohio, after a two days' session and hearing a large amount of evidence, made the following award on the night of the 31st ult.: That from and after December 18, 1886, the date of the agreement to arbitrate the case, the price for mining coal in the Mahoning Valley shall be advanced from 55 cents to 65 cents per ton, and the wages of drivers and roadmen shall remain as they now are, at \$1.75 per day. Most of the men remained at work pending the result of arbitration.

The shipments of coal by river from Pittsburgh for 1886 were as follows:

Bushels..... 91,664,000

Tons..... 3,450,918

The shipments for 1885 were as follows:

Bushels..... 74,324,000

Tons..... 2,972,500

The Basic Lining for Refiners.—Mr. J. E. Stead, of Middlesbrough, the well-known English metallurgist, states that Messrs. Stevenson, Jacques & Co., of Middlesbrough, have a process which they have carried on for many years in their works. Shortly after the introduction of the basic process they hit upon the idea that it would be a very good thing to line the open fire refiner with limestone. This they did, and kept the slag very basic indeed. Of course, the furnace consists of a bath of metal covered with coke. The slag bubbles about the top and under the coke, and air is injected into the surface of the metal from tuyères inclined at a certain angle at each side. Those who have had experience in refining know that under ordinary conditions about 50 per cent. at the most of phosphorus is removed, but in this process they obtain a refined metal containing 3 per cent. of carbon and only ½ per cent. of phosphorus.

An English journal enumerates the following as among the inventions which are specially needed at the present time: Macaroni machinery, good red-lead pencils, typewriters that will work on account books and record books, indelible stamp cancelling ink, a practical car starter, a good railway-car ventilator, better horse shoes, locomotive headlights, an instrument for measuring the velocity of wind currents, apparatus for measuring the depth of the sea without sounding by line, piano-lid hinge which shall be flush on the outside, good fluid India ink for draftsmen, a good metallic railway tie, an effective cut-off for locomotives, a method of alloying copper and iron, and a molding material for iron and brass casting capable of giving a mold that can be used over and over again.

Metal Market.

Copper.—The year opens with a steady market at 12¢ for Lake Ingot, spot and January, asked, for which 11.70¢ is bid and refused. Probably 11.34¢ would be given if sellers could be found thereat. We quote Arizona, 11¢ @ 11.14¢; Baltimore, 10.34¢ @ 10.14¢. Meanwhile the London market for Chili Bars, which had not swerved from £38. 10/ on December 30 and 31 and January 3, has suddenly taken an upward turn, and after rising to £39 yesterday they were cabled £39. 2/6 this morning. Best Selected in the meantime advanced from £43 to £43. 10/ It is at any rate auguring well to see people on the other side in such buoyant spirits in the metal trade at the very threshold of the new year. According to Messrs. James Lewis & Son, Liverpool, the import of American Copper into Liverpool and Swansea up to December 22 has been:

	Tons.	Tons fine.
Bars.....	1,495	1,434
Ingot.....	278	278
Matte.....	17,411	10,818
Ore.....	1,267	420
Precipitate.....	50	35

Total.....	12,985
Into London.....	454
Into France.....	4,142
Total.....	17,581

Tin.—Immediately after our last issue, with London down to £99, a large quantity of spot and January Tin was thrown on our market ex late large arrivals, and forced off at 21.34¢, about 100 to 150 tons being sold thereat; also about 50 tons February delivery, at 21.90¢ @ 21.95¢. Since then London, having gradually improved to £99. 10/ and £100, further sales were made of spot and of February delivery at 22¢ and 22.05¢, but since the beginning of the week a better feeling has prevailed, spot Tin having been sold at 21.95¢ @ 22¢, February at 22.10¢ and 22.15¢, and March at 22.34¢. We close steady at 22¢ for spot and January, 22.14¢ for February and 22.34¢ for March. The statistics at the beginning of the year are very favorable, showing as they do a large reduction in the visible supply of the world, 11,763 tons in Europe and America, against 15,335 a year since. At the same time it cannot be ignored that this was known and anticipated by those who are conversant with the Metal's position, and the latter has certainly not been much altered for a month or two past. The supplies from the Straits for Europe and America have increased during last year about 2500 tons; those from Australia, on the other hand, have decreased 1000 to 1100 tons. It remains to be seen now whether the Straits' supplies, at the present high dollar price there, will continue the same ratio of increase, namely, 10 % over and above 1885 or whether production will this year show a further increase at the same rate over 1886, if so it will cover amply the increased consumption of the world, and restore the diminished stocks. It seems to be out of fashion everywhere to hold large Spot stocks, while communication per cable and steam enable dealers to rapidly supply any increased requirements. This may explain the willingness with which London parted with about 1000 tons of Tin during December, shipped to this side from their warehouses at the close. Ten tons February sell at 22.15¢. Tin Plates.—There has been hardly anything doing here, but prices have been very steady and firm, at the ensuing quotations for large lines, ordinary brands, per box: Charcoal Bright, \$4.75 @ \$5.25, ditto Tarned, \$4.25 @ \$4.62 1/2, and Coke Tin, \$4.30 @ \$4.50. Futures are wanted, but held higher. In Liverpool the demand seems to be fair; indeed, with prices strong and tending upward, after advancing 6d. since our last. Nothing new modifying the stoppage in South Wales; the decreased output is 20,000 boxes weekly. Liverpool quotes Charcoal 14/6 @ 17/6 and Coke is cabled 13/9.

Lead.—Just before the close of the year a dealer who got frightened, it seems, forced off 100 tons Common Domestic at \$4.15, but this price is offered in vain since, and nothing can be had for less than 4.14¢. What the next move will be nobody can guess at present; consumers pretend that they have lead enough to last them this month at least, at the end of which they may be able to form some opinion as to the future. Meanwhile Common Lead is unsalable at St. Louis at 3.90¢. Soft Spanish is steady in the London market at £12. 12/6.

Spelter and Zinc.—Our market for Common Domestic Spelter is moderately active and strong at \$4.55 @ \$4.60, and Silesian is nominally worth 4.74¢ @ 5¢. In London the latter improved 2/6, to £14. 7/6. We quote Bertha Refined 8¢. Sheet Zinc.—Has continued quiet and unchanged at 5.55¢ @ 5.60¢ Domestic.

Antimony.—Hallett remains steady at £34 in London, and here at 7 1/2¢, with a good demand, Cookson commanding 9 1/2¢ in the meantime.

New York Metal Exchange.

The following sales are reported:

THURSDAY, December 30.	
10 tons Tin, spot.....	21.75¢
10 tons Tin, January.....	21.75¢
10 tons Tin, February.....	21.74¢
10 tons Tin, February.....	21.90¢
FRIDAY, December 31.	
45 tons Tin, January.....	21.80¢
10 tons Tin, February.....	21.85¢
20 tons Tin, February.....	22.00¢
10 tons Tin, February.....	22.04¢
MONDAY, January 3.	
20 tons Tin, spot.....	21.90¢
10 tons Tin, February.....	22.10¢

10 tons Tin, spot.....	21.95¢
10 tons Tin, spot.....	22¢
20 tons Tin, February.....	22.15¢
10 tons Tin, February.....	22.10¢

Old Metals, Rags, &c.

The purchasing prices offered by dealers are as follows:

Heavy Copper.....	30¢
Light Copper.....	27 1/2¢
Copper Bottoms.....	27 1/2¢
Brass, Heavy.....	20¢
Brass, Light.....	19 1/2¢
Composition.....	19 1/2¢
Lead, Heavy.....	20.00¢
Lead, Light.....	19.00¢
Tea Lead.....	18.00¢
Zinc.....	18.00¢
Wrought Iron.....	15.00¢
Light Iron.....	9.00¢
Stove Plate Iron.....	9.00¢
Machinery Iron.....	14.00¢
Grate Bars.....	5.00¢
White No. 1.....	0.04¢
White No. 2.....	0.03¢
Canvas, Linen, No. 1.....	0.04¢
Canvas, Cotton, No. 1.....	0.04¢
Canvas, No. 2.....	0.03¢
Second.....	0.01¢
Soft Woollens.....	0.05¢
Mixed Rags.....	0.01¢
Gunny Bagging, No. 1.....	0.10¢
Julie Butts.....	0.10¢
Book Stock.....	0.07¢
Newspapers.....	0.04¢
Waste Paper.....	0.04¢
Kentucky Bagging.....	0.04¢
Kentucky Bale Rope.....	0.04¢
Kentucky Bagging.....	0.04¢

Steady Chimneys by Loading.—Mr. A. Hollenberg contributes to the *Zeitschrift* of the German Society of Engineers, an article upon the prevention or diminution of oscillation in chimney-stacks and high walls, by loading with an excess of dead weight. He cites an instance of a chimney only 56 feet high, built in common lime mortar, which when completed was observed to oscillate to an alarming degree. Consequently the chimney was loaded by putting on the top an iron plate weighing upward of 2 1/2 cwt. The cure was perfect. Although the stack is built in an exposed situation, it has stood for 16 years, during which many severe storms have tried its strength, yet it does not show any horizontal or vertical cracks. Similar results are recorded in connection with the construction of a mill at Millfort, near Rheydt. Here a mill owner found it necessary to lighten a building by two stories, without interrupting work in the factory below. The constant vibration caused by the machinery, however, destroyed the walls as soon as the bricks were laid. To check this effect the walls were heavily loaded with iron rails as fast as the cement would bear them; and by this means the additional height was safely reached, the vibration of the walls being completely stopped. Heavy stone and iron curbs for chimneys are not so generally placed upon chimney tops as formerly. It is commonly thought that these finishing touches were intended for ornament only; but according to the foregoing statements, there may have been more reason for them than has been generally supposed.

Under date of January 1, the Bellaire Nail Works, of Bellaire, Ohio, inform us that they will start their nail factory on the 10th inst., after a suspension of seven months on account of labor troubles. Their product will be Steel Nails, exclusively, and the company will aim to make goods of the highest quality.

A gentleman who has recently returned from Puget Sound gives the London *Ironmonger* figures which appear to foreshadow a future for the locality as an iron-making district. Any quantity of waste lumber is to be had for the asking, while the bituminous coal on Texada Island yields 71.13 per cent. of coke in beehive ovens. The Texada mines are 130 miles from Irondale, and they are said to be practically inexhaustible. Analyses show about 64.43 of metallic iron, with phosphorus about 0.31 to 0.78. The costs of pig iron are said to be at Puget Sound \$13.82 made with charcoal, or \$10.37 with coke. At Texada the charcoal pig costs \$11.20, and the coke pig \$7.75. With more furnaces and a large output the cost would be lowered.

The ironwork on the cantilever bridge at the Market street crossing in Philadelphia will be erected next spring. The bridge is composed of two cantilevers and a plate girder span at each end, spanning the Pennsylvania Railroad on one side and the Baltimore and Ohio on the other side. The total length of the structure will be 532 feet 2 inches between back walls of bridge. Total width between railings will be 77 feet, making a sidewalk on each side of 12 feet 6 inches and a roadway between curbs of 54 feet. The roadway will be composed of cement and sidewalks of granite. The total weight of iron used in the construction of the bridge is nearly 4,000,000 pounds. R. A. Malone & Son, of Lane, have the contract for building the structure at a cost of \$271,000. Coffrode & Saylor, of Pottstown, are manufacturing the ironwork.

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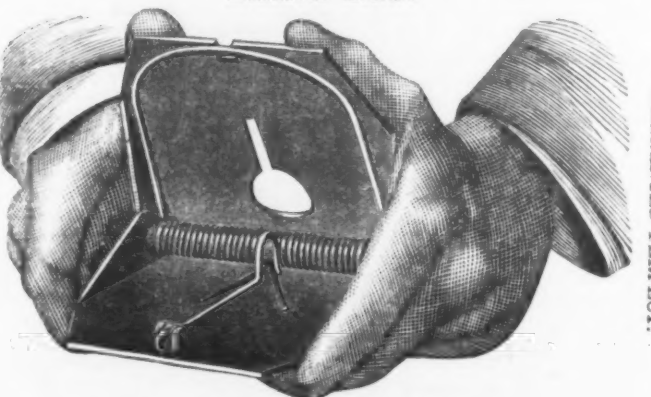
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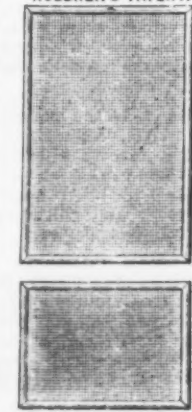
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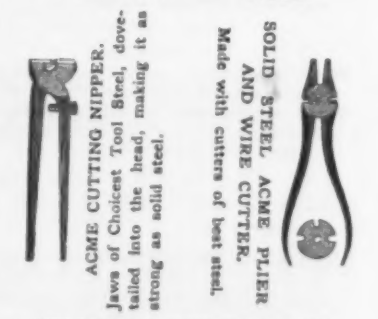
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juice from large and small lemons
in five seconds.

Sent by mail on receipt of 15 cents; \$1 per doz.
Cash with order. Agents wanted. Ask your
jobbers for them. Address patentee and
sole manufacturer,
W. F. MOULTON, Burlington, Vt.

ACME CUTTING TOOLS.

Made in all Sizes.



HIGGANUM HARDWARE CO.

HIGGANUM, CONN.

"THE DETECTIVE

Burglar Alarm."

Patented in this and other Countries

May be applied to any door
or window in a few seconds
When the door is opened or the
window raised the Alarm falls
to the floor, exploding a No. 32
blank cartridge.

Packed complete with four
cartridges, weight 6 ounces.

Endorsed by Hon. Wm. R.
Smith, Mayor of Philadelphia,
and Gen. James A. Stewart,
Chief of Police.

Having improved the Alarm
and are now manufacturing
them in large quantities, we
are prepared to quote lower
prices than heretofore—viz.,
\$1.50 per dozen, or \$14.00 per
gross; no charge for boxing or
cartage.

Sample sent by mail on re-
ceipt of six cents. We furnish
handsome gilt signs and frames
with every order.

110 Gross sold in the past year.

Owned and Manufactured by

Spencer E. Carr & Co.,

Ninth and Jefferson Sts.,

Philadelphia, Pa.

The Agricultural Crisis in Java.

The decline in the value of sugar has led to a severe agricultural crisis in Java, the most valuable island of Netherland-India. Matters have reached such a critical point that considerable uneasiness is felt there and in the mother country, and the Government is urged to do something toward the relief of sugar planters. A sugar estate near Passaroeng, for which the sum of 800,000 guilders was offered in vain seven years since, sold in September last for 28,000 guilders; 587 acres of cane land sold at Salatiga for 410 guilders, for which in 1882 118,000 guilders had been paid. One of the largest plantations, formerly estimated to be worth several millions of guilders, was recently bought by a Chinese capitalist for 525,000 guilders. Most of the plantations sold this year have passed into the hands of rich Chinamen, and in the majority of cases they have acquired the estates together with valuable new machinery for a mere song, buying the same with their own capital instead of taking a mortgage thereon at an onerous interest, and employing cheap Chinese coolie labor to work the plantations. They are thus sure to make money even in the event of sugar declining to a still lower level. And this, in spite of the heavy taxation which the sugar planting interest complains of, to have these Chinese millionaire planters among them in the future, underselling them, is anything but a reassuring prospect. Aside from the exorbitant railroad freights, and there is an export duty of 9 cents per picul. All the Government has so far felt liberal enough to offer the suffering private planters has been to proffer them an advance of money for the 1887-88 crop at the rate of 1½ guilders per 100 kg., or 92 centimes per picul, while the Government planters are to have credit for the rents they pay the Government, 6 per cent. interest to be charged in both cases. This half measure has been received with derision in Holland as well as in the island itself. The Government of the Netherlands might have been generous enough to follow the example of the Colonial Government of Ceylon and have freed the sugar planters during these distressing times of all taxes. The case is all the more urgent as the prospect of sugar recovering much in value is slim enough. Fortunately the entire industry of Java and Netherland India, generally, is not in as precarious a condition as the sugar branch since the 50 per cent. rise in coffee, an improvement in which the Government has a large share, so much so that it can well afford to show the sugar planters some liberality. Indeed, while the sugar planters see ruin stare them in the face the coffee planters are fast recovering the losses which late years had entailed, with a fair chance of realizing fortunes in the future.

Our business relations with Java and the remaining colonies belonging to Holland in the east being considerable and valuable, a glance at them may be opportune. Java and the little island of Madura adjacent to it cover an area of 131,733 square km., the population being 20,259,450, of whom 19,999,276 are natives. The remaining colonies, Sumatra, Riomo, Banca, Billiton, Borneo, Celebes, the Moluccas, New Guinea, Timor and Bali, measure, taken together, 1,728,000 square km., but do not jointly contain a population of over 8,400,000. The non native population of Netherland India and of Java alone is represented by the figures below:

	Netherland India.	Of which Java alone.
Civil European population...	43,738	35,535
Chinamen	351,828	211,287
Arabs...	15,869	10,761
Hindoo...	7,291	2,621
Total	418,716	260,174

Batavia, the capital, has a population of 96,989; Samarang, 55,815; Soerabaya, 121,047. It is curious to note the sources of revenue of Netherland-India in 1885:

	Revenue in guilders.	In Holland.	In India.	Total.
Sale of coffee...	32,646,083	7,709,000	40,355,083	
Sale of quinine bark...	241,530		241,530	
Sale of tin...	4,356,551		4,356,551	
Opium lease...	21,341,300		21,341,300	
Customs...	10,193,000		10,193,000	
Land tax or tithes...	19,337,000		19,337,000	
Salt tax...	7,167,000		7,167,000	
Postal service and telegraphs...		1,307,500	1,307,500	
Railroads...	1,215,000	4,538,000	5,753,000	
Sundry incomes...	740,096	1,825,880	2,565,976	
Total	99,332,306	108,488,580	212,640,786	
Expenses...	26,125,136	117,974,458	144,099,594	
Deficit			1,458,808	

In other words, in spite of the low price of coffee which declined to 24 centimes the half kilogram at the time, now worth 36 centimes, the budget of Netherland-India did not show a greater deficit than 1,458,808 guilders of 40 cents American, because taxes were so heavy and the railroad freights so outrageously high.

Trade of the United States with Netherland-India.

	1885.	1886.
Imports into the United States, fiscal year...	\$3,961,671	\$3,175,940
Exports from the United States, fiscal year...	2,108,066	2,182,947

There were in operation in Netherland-India in 1885 591 miles of railroad. The gross earnings of the private lines were 3,856,056 guilders, the expenses 1,315,958, and of the Government lines 2,898,052 and 1,315,749 respectively. There were in 1885 3630 miles of State telegraph in operation, of which in Java 2368, and in Sumatra 1262. The postal service is carried on by 109 offices in Java, 35 in Sumatra and 29 in the remaining islands, 85 of them having a telegraphic service attached to them.

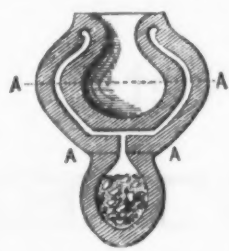
There has been a good deal of complaint for several years past about the administration of the Dutch colonies, and, including the war in Acheen, the expense it involved. The war in Acheen, in the northwest of Sumatra, has lasted some 12 years, and the Acheenes are not yet completely subdued. This war has swallowed up thousands of brave soldiers and their officers, and many millions of treasure year after year. The Acheenes are taller, stouter and darker-complexioned than the other Sumatrans; they are more active and industrious than their neighbors, and are expert navigators.

They are Mahomedans and detest the Dutch yoke. Holland has been repeatedly advised to withdraw from Acheen and acknowledge the independence of this heroic little people, but it seems that to do so might imperil other portions of the island, causing native princes to rise against her sway, and there are besides certain commercial interests not unlikely to suffer, as, for example, the black pepper trade, if the Acheenes were permitted to have it all their own way. The East India Colonies of Holland, till within a few years a source of untold riches to Holland and her merchants and shipowners, are thus traversing a crisis the end of which cannot yet be discerned, but which would not unlikely soon disappear if sugar took steadily an upward turn somewhat akin to what has happened with coffee, and if at the same time the Government took a more active share in smoothing the general course of affairs financially and otherwise.

Indian Castings.

Mr. C. Purdon Clarke, keeper of the Indian Section of the South Kensington Museum, has recently prepared a short description of certain Indian castings, which we take pleasure in presenting to our readers:

The importation of partly manufactured material is at present exercising considerable influence over many of the native arts of Oriental countries and India. The supply of machine made thread has doubled the village hand looms in some districts of Madras, and gold thread from Germany has enabled the brocade weavers to compete with the imitation brocades sent in from Europe. In some handicrafts, however, the



A A, Joints in Mold.

Indian Castings.—Fig. 1.—Mold with Crucible Attached for a Brass Jar.

supply of European material has produced a contrary effect. Iron and steel, bar and rod, have displaced an ancient industry, and sheet copper and brass rob the founder of half his work. Formerly the only means of producing sheet metal was by hammering cast plates, an expensive method, only resorted to when thin flat covers were required for wooden or other objects. For very large vessels where weight was required to be kept down and strength maintained hammered sheet was used, but generally the founder was employed to save as much as possible the labor of forming finished castings, and which required but little beating out, trimming and brazing. In the case of a bowl or flat jar with a narrow mouth the founder would prepare a cast not unlike in shape and thickness that of an ordinary flower-pot saucer, from which by constant hammering the bulbous sides would be formed projecting beyond the rim, which would remain of its first diameter and thickness. When finished such a vessel would be nearly double the size of the first cast and



Fig. 2.—Brass Jar Completed.

a remarkable example of the native knowledge of the composition of bronzes and annealing processes.

It is worthy of noting that the chief means of detecting modern from old Persian and Saracenic metal vessels is by examining for brazing joints, which in ancient vessels are rare. When not found, close examination will show the vessel to be a thin casting, the ornamentation being by inlay, or chasing and hammering, which, being done after the cast is made, often gives the reversed side the appearance of chased sheet metal. So far as I could ascertain, there are three methods of casting practiced in India. The first by molds in sand; the second, molds in clay not unlike plasterer's piece-molds; the third, clay molds formed on a wax model, the *cire perdue* of Europe. The first of these is well known in Europe, but the second is, I believe, now described for the first time. In preparing the mold impressions of the various parts of the pat-

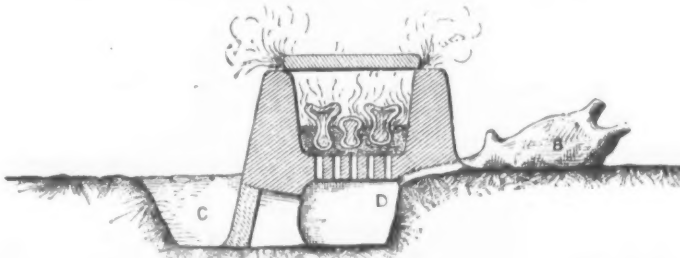


A A, Joints in Mold; B, Bezel of a Toe Ring from Mold, Fig. 3.

Figs. 3 and 4.—Mold and Crucible for Several Small Trinkets.

tern are taken in clay, and these pieces, when nearly dry, are, after trimming, stuck neatly together and kept in place by several layers of mud in which some fiber is mixed. The mold when ready has but one vent, which, placed on the most convenient side, is carried up into a sort of bottle-neck. If the object is small several molds are attached together and the vents united by a single short neck of clay, to which a crucible, inclosed in an egg-shaped ball of clay, is attached. The size of this crucible depends

upon the exact amount of metal required to fill the mold or molds; and this quantity being drawn by experience, the founder places it inside before closing up. No provision is made for the escape of air from the mold when the metal is poured in. The mold and crucible (now in one piece) are allowed to dry, and after several coats of clay tempered with fiber have also been well baked on by the sun the furnace is prepared. This is simply a circular chamber about 2 feet 6 inches in diameter, 2 feet in height, with a perforated hearth and no chimney. Half filled with charcoal, a good heat is obtained by the use of several sheep skin bellows from beneath. When ready

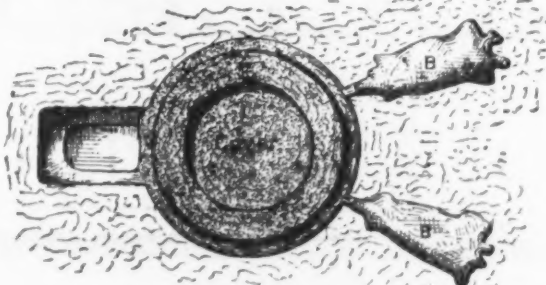


B, Sheepskin Bellows; C, Opening Luted During Firing; D, Position of Nozzle.

Fig. 5.—Section of Furnace as Employed at Lahore.

as many molds as the furnace will hold are placed in it, the crucible end of each being imbedded in the fire. A cover is placed over and the fire kept up until, upon examination, the molds are found to be red hot. They are then taken, one at a time, and replaced in a reverse position, the crucibles being now above. The metal flows down into a red-hot mold and penetrates the finest portions of the surface without suffering from air or chilling. The fire is allowed to gradually cool, and when the objects are broken out of their clay covering the metal is soft and malleable.

The third manner of casting (that by the use of a wax pattern which is destroyed in the molding) is well known, but in one particular case the process has been carried further than would be at first believed, and of this I will now attempt a description. The object produced is an anklet, a flexible ring about 4 inches in diameter, made from an endless curb chain. Such curb chain trinkets are common in India, and are generally made from thick silver wire rings interlinked and soldered one by one. In this example the anklet is of bronze and consists



B B, Bellows.

Fig. 6.—Plan of Furnace.

of a complicated chain of 43 detached links, the whole being cast by a single operation. The first part of the process is the preparation of a pattern in wax, a delicate work, each link having to pass through four others and to bear three small knobs or rosettes. These are in two instances but ornaments; the third, however, serves a channel for the metal to enter each ring. Then commences the most difficult part of the work, each ring having to be slightly separated, and this is effected by painting in a thin coat of fine clay until there is sufficient to form a partition. Other costs of clay are added until a thickness of about ½ inch is attained, when a groove is cut round the upper side of the ring and deepened until the row of knobs is bared. The wax is then melted out and the mold attached to a crucible, as before described. When cast and the mold broken away the chain comes out inflexible, being attached to a rod which runs round where the groove was cut. This is broken off and the chain is complete.

Having been consulted respecting the trades to be represented in the Indian courts of the Colonial and Indian Exhibition, I recommended among others a good brass founder to be sent. Dr. Tyler, who was charged with the collection of these artisans, engaged one the best he could find, but up to the present the foundry is not in working order. I submit for your inspection one of these combined crucible molds, with fragments of another, also a cast curb chain anklet, and now conclude by thanking you for this opportunity of publishing an interesting process.

Organization of Bridge Builders.

The iron-bridge builders of the country have had under consideration, for some time past, a scheme of organization for their mutual advantage, which assumed a practical form at a meeting held at No. 18 Broadway, New York, on December 29, when the American Bridge Builders' Association was formed, a constitution was adopted and officers were elected. The object of the organization is somewhat analogous to that of the Master Mechanics' and Master Car Builders' Associations; that is, it is intended to promote the advancement of knowledge concerning the construction of bridges by discussions in common, investigations and reports on the strength and qualities of materials used in bridge construction, and to provide an organization through which bridge engineers may agree upon the qualities of the materials and workmanship which should be put into bridges, the nature of specifications and the character of the inspection required to secure bridge structure satisfactorily alike to engineers and to those who use and pay for them.

That an organization of this kind may be of immense advantage to railroad companies has been shown by the experience with kindred associations. It may not unfairly be supposed that the persons who know most about bridge construction are bridge builders who are constantly obliged to study the theory and the practice of their art. The experience and knowledge of such persons regarding their specialty is, therefore, of more value than that of any other class of persons. If, then, railroad companies can have the benefit of the deliberations which may result from such an organization, it will be very much to their advantage. There can

be no doubt that a great deal of good has resulted when some of the railroad organizations have called in the manufacturers of various articles which are used on railroads. The following parties have become members of the new association: The Union Bridge Company, Keystone Bridge Company, Edgemoor Iron Company, Detroit Bridge and Iron Works, Passaic Rolling Mill, Morse Bridge Company, Cofrode & Saylor, New Jersey Steel and Iron Company, C. J. Schultz and Phoenix Bridge Company. The following officers were elected: A. L. Griffin, president; Willard Pope, vice president; William H. Cornell, secretary and treasurer.

Coal Barges vs. Schooners.

The Boston Herald says: "For years the great supply of coal brought to this port, for use here or for delivery along the long line of railways that, stretching from tidewater, reach out into the many manufacturing places of New England, has found transportation from coal ports by means of sail-

ing vessels, mostly schooners, and a great and magnificent fleet of these vessels has sprung into existence and been able to pay handsome dividends to their owners and agents, besides giving employment to a vast number of seamen. This fleet consists mostly of three-masted schooners, built at great expense for this particular trade, and while our deep-water vessels have continued gradually to disappear from the ocean highway the sails of these colliers have whitened the bays and sounds of our shores, lined our docks and given employment to sail, spar and boat builders without number. For a long time these sailing vessels have all but controlled the coal trade between the coal ports and Boston, the fleet of iron steamers belonging to the Philadelphia and Reading Coal and Iron Company getting only that company's own trade, with an outside steamer or two occasionally making a coal trip. Within five years, however, a new, important and what is likely, in the future, to prove a disastrous factor for sailing vessels—coal barges towed by powerful steamers—has entered the business, and has vastly reduced the charges of transportation, as well as the chances for the schooners to secure paying rates.

Most of these barges are sailing vessels cut down and rebuilt to suit the coastwise coal trade. While the schooners have to carry large crews, are fitted with expensive sails and running gear and are subject to constant detention by the fickleness of the winds and tides, the coal barges, two or three of them strung out on long hawses towed by powerful tugs, push along the coast from the receiving to the delivery port slowly, but surely, delayed only by heavy weather, which is as much to be dreaded by the schoomermen as by him who sails a barge. These barges, many of them, have two or three masts, hoisting small fore and aft sails, and are provided with steam power for delivering cargo, hoisting ground tackle, &c. The barges are also heavy carriers, 1200 to 2000 tons being the cargo of a majority. When the idea was first advanced that barges could be successfully used in the Boston coal trade, the idea was laughed at. 'You can never get them over the shoals and around Cape Cod,' said the tow boatman, 'except in exceptionally smooth weather, and waiting for such chances will eat up the profits; in winter especially such heavy weather prevails at all times along the Cape that then the business will surely prove unprofitable; more barges will be lost than can be got to port, and a thousand other difficulties were enumerated. The tug America, with two barges, owned by a New London concern, was the first to make the venture, and it proved successful, and now a fleet of these craft, owned in Boston, have entered the

business, and it is said are making money in it, and driving the handsome schooners out of the trade. The largest concern in this trade at present is the Boston Towboat Company. This concern already has seven large barges running, and will soon have many more."

Imports.

The following were the Imports of Hardware, Iron, Steel and Metals into the Port of New York for the week ending January 5, 1886:

Hardware.	Quantity.	Value.
Aucinchloss Bros.
Machine case, 1
Baker Hermann & Co.
Cases, 7
Anvils, pkgs., 138
Cases, 8
Cooke, G. K.
Cases, 8
Dieckerhoff, Raffler & Co.
Cases, 4
Ely & Williams
Mach'y, case, 1
Field Alfred & Co.
Anvils, 155
Case, 1
Guns, cases, 3
Mdse., cs., 14
Fraser & Co.
Case, 1
Graef Cutlery Co.
Cutlery, cs., 5
Harety & Graham.
Arms, cs., 4
Harrison Bros. & Howson.
Cases, 2
Jewett, J. T.
Mach'y, cs., 4
Mach'y, pack, 1
Johnson, B. S.
Mach'y, case, 1
Kastor, A.
Cks., 2
Lau & Co.
Cutlery, cs., 2
McCoy & Sanders.
Cases, 9
Mdse., cs., 16
Radick, I.
Mach'y, cs., 4
Schleran, C. A. & Co.
Mach'y, case, 1
Schoverling, A.
Arms, cases, 6
Schutte, W. & Co.
Cases, 17
Veil Bros.
Cases, 2
Von Cleft & Co.
Ironware, cs., 11
Waldon, I.
Mach'y, cs., 2
Wienisch & Hilger.
Cases, 6
Hones, case, 1
Cases, 4
Witte, John G. & Bro.
Cutlery, cs., 8
Wood, E.
Files, cks., 2
Order.
Mach'y, cs., 9
Cases, 4
Iron.	Quantity.	Value.
Ackermann & Co.
Rods, bds., 605
Alpers & Mott.
Enameled boilers, 2
Boiler cover, 1
Stoves, case, 1
Baring Bros. & Co.
Wire rods, coils, 547
Bars, 10,473
Coils, 1249
Bds., 537
Brown Bros. & Co.
Bars, 7214
Bds., 190
Crocker Bros.
Pig, tons, 100
Spiegel, tons, 36
Ferro, cks., 160
Carey & Moon.
Rods, bds., 10
Jacobus, E. Y.
Bars, 54
Plates, 2
Keeler, W.
Pigs, 871
Merch. Desp. Co.
Girders, 435
Metals.	Quantity.	Value.
Elwell, Jas. W. & Co.
Yellow metal bar, 1845
Old copper, lbs., 127
Noel, Aug. & Sons.
Finfol, cs., 3
Sanderson & Sons.
Spelter, plates, 100
Ferro, cks., 160
Thompson, G. K. & Oves
Co.
Asbestos fuel, cks., 6
Thompson, A. A.
Spelter, plates, 5119
Order.
Tin plates, bxs., 5008
Tin slabs, 3537
Spelter plates, 9693
Copper, cks., 51

The imports of Cutlery, Hardware and Metals at this port during the week ending December 31 were as follows:

	Quantity.	Value.
Anvils	31	\$3.29
Base goods	39	8.29
Bronzes	29	3.04
Chains and anchors	1	55
Clocks	60	6.28
Copper	95	212
Cutlery	94	33.47
Dutch metal	2	103
Guns	88	10.61
Hardware	38	9.99
Iron, pig, tons	1,075	12.91
Iron, sheet, tons	10	2.74
Iron, spigot, tons	1,210	22.49
Iron ore, tons	591	1.12
Iron tubes, tons	3,079	2.27
Iron, other, tons	2,431	52.21
Machinery	828	17.70
Metal goods	323	24.86
Nails	21	2.28
Needles	18	3.79
Nickel	14	1.34
Old metal	1	4.37
Patina	100	3.30
Quicksilver	20	2.45
Saddlery	95,746	2.72
Spelter, B.	95,746	108.69
Steel	95,746	6.13
Tin, bxs.	12,198	228.12
Tin, slabs	1,266,058	228.12
Wire	4	10.25
Zinc	9,045	740

The following is a comparative statement of the imports of Iron and Steel at this port for three years:

	1884.	1885.	1886.
Copper and ore	117,897	152,050	239,060
Iron, bar	2,146,056	1,846,598	1,851,704
Iron, pig	2,343,399	1,651,544	1,079,093
Iron, railroad bars	9,146	6,269	1,991
Iron, sheet	35,611	22,819	260,399
Lead	122,737	130,555	480,149
Spelter	148,580	98,305	132,409
Steel	3,083,016	2,631,411	4,119,56
Tin and tinplates	12,824,753	12,264,895	13,230,972
Zinc	56,110	22,333	22,400

A steam yacht is to be shortly fitted up in England with a Brush dynamo and electric light equipment, to be used in the process of pearl fishing on the South Australian coasts. The lamps are inclosed in strong glass globes, specially made to withstand the heavy pressure, and it is expected that successful use will be made of them at as great a depth as 17 fathoms. Diving is not usually carried on otherwise at more than about 7 or 8 fathoms, so that a decided improvement is hoped for in the pearl fishery.

It is stated that the basic Bessemer plant of the Pottstown Iron Company is now working successfully.

Mineral wool is no longer made from blast furnace slag. The necessary raw materials are melted down in the cupola.

AMERICAN IRON AND STEEL WORKS.

JONES & LAUGHLINS, Limited,
Lake and Canal Streets, Chicago,

MANUFACTURERS OF

STEEL NAILS,
MERCHANT BAR, BAND, HOOP and SHEET IRON,
Chains, Spikes, Bolts, Rivets,
BESSEMER STEEL,
BEAMS, CHANNELS, ANGLES, TEES, PLATES, &c.,
COLD ROLLED SHAFTHING.

WORKS AT PITTSBURGH, PA.

LOVELL MFG. CO., LIMITED, ERIE, PA.

MANUFACTURERS OF

CLOTHES WRINGERS,

Delusion and Bonanza Mouse Traps,

The Folding Wire Rat Trap,

ERIE RAT TRAP,
ETC.

TO THE TRADE.

GENTLEMEN:

We ask your special attention to our new line of Clothes Wringers. An experience of over thirteen years in the manufacture and sale of this class of goods, we believe, enables us to judge correctly of the wants of the trade and the public.

Special care has been taken in the construction of all our Wringers, to overcome difficulties and weak points that have been developed in this class of goods by past experience, and we believe a careful examination will show that we have succeeded in this respect in a marked degree.

Our facilities for the production of these goods are unexcelled; we have a new factory, the latest and most improved machinery, the best of skilled workmen, and are fully able to meet any demand that may be made upon us, either for quantity or quality.

We do not use the old Tube Rolls in any of our Wringers, but use exclusively the Patent Rolls, in which the Rubber is Vulcanized upon the Shaft.

In all our lines of goods we shall endeavor to keep the standard of quality up to such a point of excellence as will merit the confidence and favorable consideration of the entire trade. All correspondence and orders will receive prompt and careful attention.

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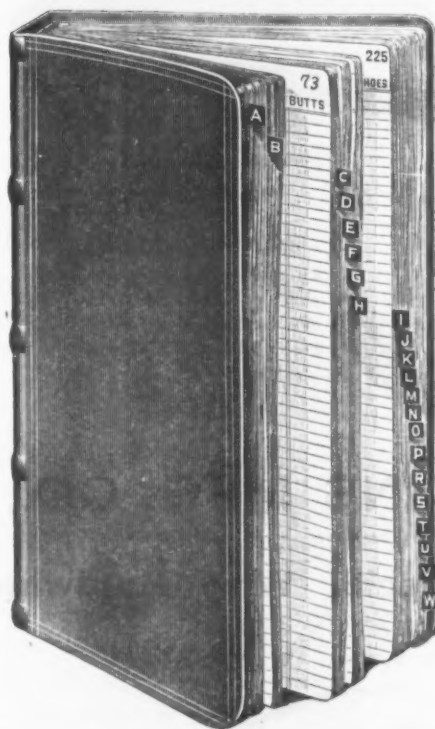
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LOVELL MFG. CO., LIMITED, ERIE, PA.

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On the first page opened to by the index letter will be found a list of articles beginning with that particular letter, arranged with two spaces after each item for additions of other goods in proper alphabetical order.

Sizes or leading lines are printed, and in case of Rules and Planes comparative numbers are given. Lists are omitted for the obvious reason that they are liable to change, but forms are arranged so that lists may be added with pencil. Useful tables are inserted on Strap Hinges, Nuts, Washers, Wire, Rivets, Stocks and Dies, Rope and Nails. The book is intended primarily for *Salesmen*, but it is no less useful to *Buyers* or *Stock* and *Entry Clerks*, and can be adapted to any purpose for which a price book may be desired. The general plan of the Pocket Edition is the same as in the large book, but the ruling and printing are on a smaller scale. The book is small enough to be carried in the pocket without inconvenience, but the arrangement is so perfect that it will cover a very complete line of hardware.

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6 1-2 x 10 Inches. 32 Pages. Bound in Leather. Price, \$3.00.

THE Book consists of a collection of Standard Hardware Lists, printed in uniform style, good form and clear type, followed by a Discount Table showing extensions at 23 discounts, ranging from 10 to 80 per cent. Any other list required for frequent use may be added by the purchaser and the discount table will apply equally well. If lists change, new ones may be substituted, and the use of the book is not in the least impaired.

The *Discount Table* is arranged so that reference is very quickly made. Computations are made on each figure from 10 cents to \$5.00. From \$5.00 to \$15.00 the advance is by 5 cents, thus: \$5.05, \$5.10, &c., except in cases where printed lists contain odd figures which are inserted. From \$15.00 to \$50.00 only such amounts are extended as are required by the lists.

ROOT'S HARDWARE PRICE CARDS.

THESE cards cover the lines having a large variety of sizes or numbers, avoid marking each package or article in Retail Stores, and are very convenient for use in Wholesale Sample Rooms. They secure correct and uniform selling prices, pay for themselves several times a year by saving time, and are intended for at least ten years' constant use. Hence no Hardware Dealer can afford to do without them or spend the time required to write and rule out something similar by hand. They are printed in very distinct type on the best paper appropriately ruled with blue ink cross lines and red ink down rulings, for noting in pencil List, Cost, Jobbing and Selling Prices, as in sample of Card 11-A, shown in the last column of this page. Cards A and B of each number are mounted on EACH SIDE of a tough, heavy cardboard, especially adapted for this use, which is further protected on the four edges by being CLOTH-BOUND.

Two-thirds of them are 3x13½ inches. This size has been found convenient for hanging on a pilaster finish, or any other narrow surface, without hiding the goods. To hang or chain up each card there is firmly inserted through the top and center a nickel-plated eyelet about ¼ inch inside diameter. They will be sent, CHARGES PREPAID, on receipt of price.

DESCRIPTION AND PRICES.

Card No.	Description	Size and Price per Card.
1	A- Bar Iron , Weight of Round, Square and Flat, per foot and tire per set. Western Classification and Prices of Extras on American, Norway and Swedes.	5½x18 in. 40 Cts.
2	B- Bar Steel , All Kinds and Sizes, with Prices of Extras. Horse and Mule Shoes, Size, Weight, No. in Keg. Toe Calks, Cut Nails, List of Extras.	3x13½ in. 30 Cts.
3	A- Cut Tacks , exact size cuts. Length. Number in a pound.	3x13½ in. 30 Cts.
4	B- Large Head Carpet Tacks , Gimp and Lace Tacks, Hungarian Nails, Hob Nails, Blued and Tinned, American and Swedes. Exact size cuts shown of all the above.	6x16 in. 40 Cts.
5	A- Shoe Nails , Clear Box Nails, Copper Tacks, Double Pointed Tacks and Cuts, Glaziers' Points and Cuts, Barbed Blind Staples.	3x13½ in. 30 Cts.
6	B- Patent Brads , Finishing Nails, Blued Clout Nails, Tinned Clout Nails.	3x13½ in. 30 Cts.
7	A- Iron Wire Screws , (continued). Iron Machine Screws.	3x13½ in. 30 Cts.
8	A- Standard Carriage Bolts , (continued). Plow Bolts.	3x13½ in. 30 Cts.
9	A- Machine Bolts , (continued). Round and Flat Head Stove Bolts.	3x13½ in. 30 Cts.
10	A- Philadelphia Carriage Bolts , (continued). Wrought Washers.	3x13½ in. 30 Cts.
11	A- Square and Hexagon Nuts , Size of Hole, Width, Thickness, number in 100 lbs.	3x13½ in. 30 Cts.
12	B- Coach or Lag Screws , Superior and Norway Axle Clips.	3x13½ in. 30 Cts.
13	A- Bright Screw Hooks , Belt Hooks, Blake's Belt Studs.	3x13½ in. 30 Cts.
14	B- Bright Screw Eyes , Gate Hooks and Eyes, Cornice Hooks and Eyes.	3x13½ in. 30 Cts.
15	A- Plate Casters and Bed Casters , (continued). Trap Door Rings.	3x13½ in. 30 Cts.
16	B- Wrought Hooks and Staples , (continued). Trap Door Rings.	3x13½ in. 30 Cts.
17	A- Saws , Hand, Panel and Rip, Combination and Back, Disston's and W. M. & C's, corresponding numbers and "Our Brand".	3x13½ in. 30 Cts.
18	B- Saws , Back, Compass, Pruning, Kitchen, Butcher's Row and Blades, Framed Wood Saws and Blades.	3x13½ in. 30 Cts.
19	A- Chisels , Slicks, Socket Framing, Socket and Tanged Firmer, Corner.	3x13½ in. 30 Cts.
20	B- Turning Chisels and Gouges , Socket and Tanged Firmer Gouges.	3x13½ in. 30 Cts.
21	A- Cast Steel Augers and Bits , Boring Machine Augers, Jennings' Auger Bits.	3x13½ in. 30 Cts.
22	B- Bit Stock Drills , Gimlet Bits, German Pattern, Double Cut and Counter Sink, Center Bits, Clark's Expansive Bits.	3x13½ in. 30 Cts.
23	A- Hammers , Adze, Eye, Bell Face, Joiners', Steel Face and Claw, Riveting, Farriers', Blacksmiths', Machinists', Engineers'.	3x13½ in. 30 Cts.
24	B- Hammers , Tack, Masons', Sledges, Miscellaneous, Hatchets, Shingling, Lath, Half, Claw, Broad or Bench, Hunters'.	3x13½ in. 30 Cts.
25	A- Files , Bastard, Mill, Flat, Hand, Half-round, Round, Square, Knife, Warping, Second Cut, Mill, Flat, Hand Half-round, Smooth, Flat and Hand.	7x15 in. 50 Cts.
26	B- Files , Smooth, Half-round, Round, Cabinet, Pit Saw, Hook Tooth, Gin Saw, Band Saw, Cant, Taper, Stubbs' Taper, Rasps, Cabinet, Wood, Shoe, Horse.	3x13½ in. 30 Cts.
27	A- Rubber and Hemp Packing , Gaskets or Rings, Rubber Hose.	3x13½ in. 30 Cts.
28	B- Leather and Rubber Belting .	6x18½ in. 40 Cts.
29	A- Window Glass , List Prices and No. Lights per box. Also ruled columns for other Wholesale and Retail rates.	3x13½ in. 30 Cts.
30	B- Sash, Doors and Blinds , List Prices.	3x13½ in. 30 Cts.
31	A- Hinges , Strap, Light and heavy, T. Light, Heavy and Extra Heavy, Hinge Hasps, Screw Hook and Strap.	3x13½ in. 30 Cts.
32	B- Screw Hook and Eye Hinges , Barn Door Hangers, Checked Back, Kidder's, Anti-Friction, Wrought Frame, Barn Door Stay Rollers, Rail, Pulls, Latches, Sliding Door Rails.	3x13½ in. 30 Cts.
33	A- Wrought Butts , Narrow, Loose Pin, Light Inside-Blind.	3x13½ in. 30 Cts.
34	B- Loose Pin Butts , Plain, Japanned and Plated Tips.	3x13½ in. 30 Cts.
35	A- Loose Joint Butts , Plain, Japanned and Plated Tips.	3x13½ in. 30 Cts.
36	B- Table Hinges , Bronzed Iron Blind Butts, Brass Butts, Narrow, Middle, Broad and Desk. Width when open given of all.	3x13½ in. 30 Cts.
37	A- Door Bolts , Barrel, Square Spring, Foot, Chain.	3x13½ in. 30 Cts.
38	B- Door Bolts , Flush, Neck and Miscellaneous kinds.	3x13½ in. 30 Cts.
39	A- Door Drivers , Flat and Round Blade, Hatchet, Clark's Screw Driver Bits, Countersinks, Reamers, Belt or Saddlers' Punches.	3x13½ in. 30 Cts.
40	B- Rules , Wrenches.	3x13½ in. 30 Cts.
41	A- Hooks , Coat and Hat, Wardrobe, Schoolhouse, Harness, Clothes line.	3x13½ in. 30 Cts.
42	B- Shelf Brackets , Drawer Pulls.	3x13½ in. 30 Cts.
43	A- Wood Planes , Plane Irons, Cut and Double.	3x13½ in. 30 Cts.
44	B- Patent Planes , Patent Plane Irons.	7x22 in. 60 Cts.
45	A- Woodenware and Baskets , Alphabetically arranged.	7x22 in. 60 Cts.
46	B- Woodenware (continued). Alphabetically arranged.	7x22 in. 60 Cts.
47	A- Pieced Tinware , Alphabetically arranged.	7x22 in. 60 Cts.
48	B- Stamped Tinware , Alphabetically arranged.	7x22 in. 60 Cts.
49	A- Granite or Ironware , Alphabetically arranged.	7x22 in. 60 Cts.
50	B- Mortise Door Locks , Latches, Knobs and Escutcheons.	7x22 in. 60 Cts.
51	A- Rim Door Locks , Latches, &c.	6½x22½ in. 60 Cts.
52	B- Padlocks , Japanned, Wrought Iron, Bronzed Iron, Brass and Jail.	7x24 in. 60 Cts.
53	A- Complete Comparative List of Corresponding Numbers of Padlocks , Mailbox-Wheeler Co., Wm. Wilcox Mfg. Co., Russell & Erwin Mfg. Co., Norwich Lock Mfg. Co., Nimick & Britton Mfg. Co. Revised to July, 1885.	4x14 in. 20 Cts.
54	B- Cabinet Keys , Drawer, Chest, Cupboard and Trunk.	4x7 in. 10 Cts.
55	A- Complete Comparative List of Corresponding Numbers of Cabinet Locks , Eagle, Corbin, Parker, Gaylord. Revised to July, 1885.	5½x9½ in. 30 Cts.
56	B- Length and number of Nails to the pound . Number of feet in a bundle of Hoop, Scroll and Band Iron. Number of feet of Wire in a pound. Coil or Cable Chain, weight per 100 feet and proof in tons. Bright Coil and Halter Chain and corresponding No. of Wire Sash weights and line required for common sized windows.	5½x9½ in. 30 Cts.
57	A- Miscellaneous Tables , Showing number Copper Rivets and Nuts in a pound. Size of skates compared with Shoes, Scale Beams, poise or weight needed for each. Brass Kettles, size, weight and capacity. Strap and T Hinges, weight and number packed in a barrel. Comparative Nos. of leading makers of Rules and Levels. Revised to July, 1885. Manila Rope, feet in a pound, weight of coils, break ng strain, &c.	5½x9½ in. 30 Cts.
58	B- Is adapted for filling in with any line of goods . It is ruled both sides, with columns headed respectively "Description," "Size or No.," "List," "Cost," "Job," "Sell."	5½x9½ in. 30 Cts.
59	A- Wire Nails , Exact Size Cuts.	5½x9½ in. 30 Cts.
60	B- Wire Nails , List prices and number in a pound.	5½x9½ in. 30 Cts.
61	A- Gas Pipe or Galvanized , List prices, Weight per foot and number threads per inch of screw. Also Malleable Pipe Fittings Illustrated.	5½x9½ in. 30 Cts.
62	B- Is ruled similar to No. 32, and is adapted for any line of goods .	5½x9½ in. 30 Cts.
63	A- Tin Plates and Metals , Sizes of Tin, Number sheets in Box, Weight and Gauge. Block Tin, Lead, Solder, Antimony, Slat and Sheet Zinc.	5½x9½ in. 30 Cts.
64	B- Sheet Iron and Copper , Iron, Common, Smooth, Galvanized, American and genuine Russia. Copper, Sheathing, Flashed and Copper Bottoms and S. Idoring coppers.	5½x9½ in. 30 Cts.
65	A- Malleable Iron , Illustrated. Whiffletree Ferrules, Tongues, Hooks, Couplings and Plates. T and Shaft Irons, Shaft, Body, Perch and Neck-yoke Loops.	5½x18 in. 40 Cts.
66	B- Malleable Iron , Illustrated. Pole and Neck-yoke Tips, End or Tail Board Plates, Washers and Nuts, Stake Rings and Irons, Wagon Box Spring Irons, Check and Footman Loops, Corner Irons, Spring and Axle Blocks.	5½x18 in. 40 Cts.
67	A- Malleable Iron , Illustrated. Axle Yokes, Wear Irons, Wrenches, Carriage Rim Bands, Oar or Row Locks.	5½x18 in. 40 Cts.
68	B- Malleable Iron , Illustrated. Step Plates, Carriage, Wagon and Cart Steps, Thumb Nuts, Sand Bands.	5½x9½ in. 30 Cts.
69	A- Handles , Illustrated. Auger Cross-Cut Saw, Axe, Broad Axe, Adze, Hatchet, Hammer, Pick, Sledge.	5½x9½ in. 30 Cts.
70	B- Is ruled similar to No. 32, and is adapted for any line of goods .	5½x9½ in. 30 Cts.
71	A- Cloth and Netting , Illustrated. Plain, Painted and Galvanized.	5½x9½ in. 30 Cts.
72	B- Is ruled similar to No. 32, and is adapted for any line of goods .	5½x9½ in. 30 Cts.

Less than a Set, Priced at the Above Rates.

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(CARD No. 11-A.)

SAWS.

DISSTON'S NO. 3. PANEL, HAND & RIP. W. M. & C. NO. 12.

Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
22				
26				
28				

DISSTON'S NO. 7. PANEL, HAND & RIP. W. M. & C. NO. 25.

Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
22				
26				
28				
30				

DISSTON'S NO. 8. HAND AND RIP. W. M. & C. NO. 26.

Length In.	List.	Cost.	Job.	Sell.
26				
28				

DISSTON'S NO. D. B. HAND AND RIP. W. M. & C. NO. 27.

Length In.	List.	Cost.	Job.	Sell.
26				
28				
30				

DISSTON'S NO. 12. HAND AND RIP.

Length In.	List.	Cost.	Job.	Sell.
26				
28				

OUR BRAND.

PANEL, HAND AND RIP.

Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
22				
26				
28				

SPECIAL C. S. PANEL AND HAND.

Length In.	List.	Cost.	Job.	Sell.
16				
18				
20				
26				

COMBINATION HAND.

Length In.	List.	Cost.	Job.	Sell.
26				

DISSTON'S NO. 1. BACK. W. M. & C. NO. 3.

Length In.	List.	Cost.	Job.	Sell.
10				
12				
14				
16				

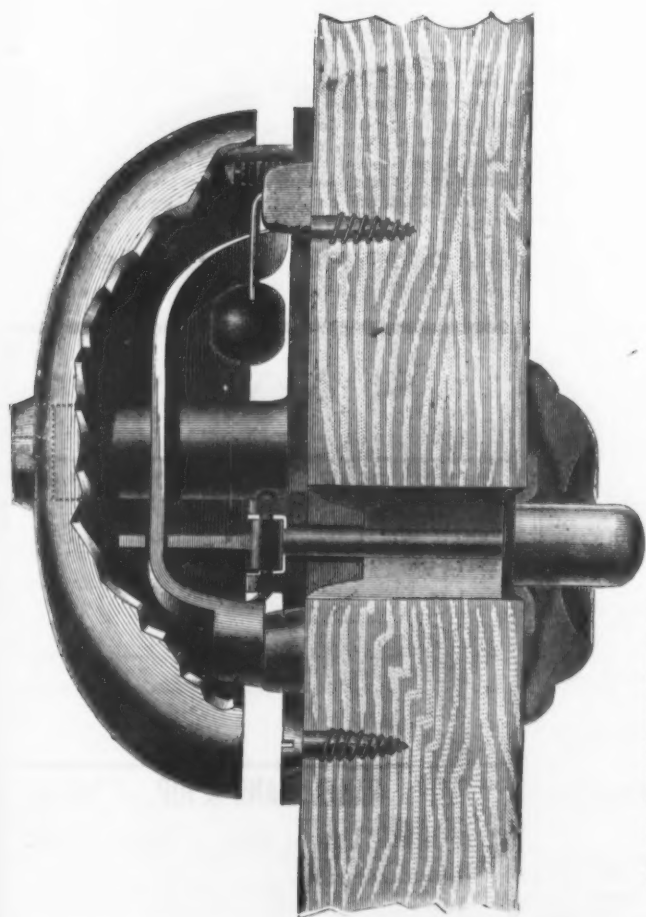
PRICES IN SETS.

PRICE PER SET.
Set No. 1 includes numbers 1 to 40 inclusive, \$11.50
Set No. 2 includes the following ten very best selling numbers to Retail Trade: Nos. 2, 3, 9, 11, 12, 13, 15, 18, 19, 32, 2.50
Set No. 3, for Dealers in Tinware and House Furnishing Goods, consists of Cards Nos. 25, 26, 27, 1.50

SENT PREPAID ON
RECEIPT OF PRICE BY

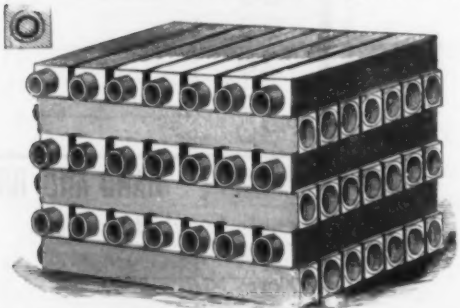
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Pressure on the button on the outside of the door rings the bell.
BRADLEY & PIERSON MFG. CO.,
298 BROADWAY, N. Y.

We present to the public a simple and reliable Door Bell. There are no springs or wires about it, consequently nothing to get out of order, and it is always ready when wanted. They will fit a door or jamb of any thickness, as the push pins can be made of free iron if desired. They can be put on by any one at little or no expense.



A. WYCKOFF & SON, ELMIRA, N. Y., MANUFACTURERS OF CHAIN PUMP TUBING.

Our Tubing is made of sound white pine, very smoothly bored, thoroughly seasoned and banded.

Special prices for car lot orders.

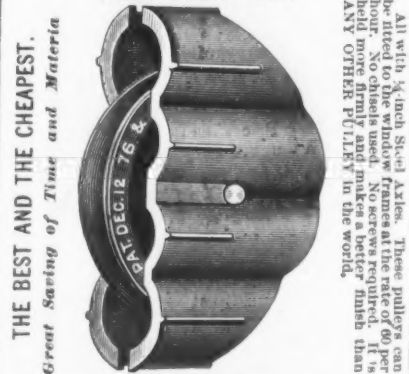


BOLTS, NUTS, RIVETS AND WASHERS, CHAMFERED AND TRIMMED. SQUARE AND HEXAGON NUTS A SPECIALTY.

J. FRED. WILSON.
MANUFACTURER OF
Cold Punched, Square and Hexagon Nuts, Washers, Chain Links, &c.
Die Making and Special Punching to Order.
23 HERMON STREET, WORCESTER, MASS.

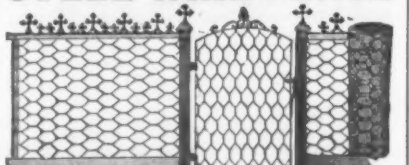


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THE BEST AND THE CHEAPEST.
Great Saving of Time and Material
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EMPIRE PORTABLE FORGE CO.,
COHOES, N. Y.,
Manufacturers of the largest and best line of
Portable Forges and Hand Blowers
FOR SALE EVERYWHERE.

SEDGWICK STEEL WIRE FENCE



Is the best general purpose wire fence in use. It is a strong net-work without barbs. It won't injure stock. It will turn dogs, pigs, sheep and poultry, as well as horses and cattle. The best fence for Farms, Gardens, Stock Ranges and Railroads. Very neat, pretty styles for Lawns, Parks, School-grounds and Cemeteries. Covered with rust proof paint, or made of galvanized wire, as preferred. It will last a life-time. It is better than boards or barbed wire in every respect. The Sedgwick Gates made of wrought-iron pipe and steel wire, defy all competition in lightness, neatness, strength and durability. We make the best, cheapest and easiest working all-iron automatic or self-opening gate, and the neatest cheap iron fences now made. The best Wire Stretchers, Cutting Pliers and Post Augers. For prices and particulars ask Hardware Dealers, or address, mentioning paper.
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MANUFACTURERS OF

SURFACE GRINDING MACHINES

For Dies, &c.
Capacity, 12 inch x 6 inch.



HERRICK & COWELL, PATENT LEVER DRILLS

With One to Six Spindles.



What is Said of "MORTON'S SASH CHAINS."

New York, July 29th, 1886.
THOMAS MORTON, Esq.
Dear Sir: I have much pleasure in informing you that the Cable Chains used throughout my house built twelve years ago, have not in a single instance given any trouble, and see no reason why they should not last a lifetime. Yours respectfully,
P. C. BARNUM, 108 Chatham Square, New York.
Mr. THOMAS MORTON.
Dear Sir: We take pleasure in testifying to the excellence of your patent Champion and Cable Sash Chains. The best endorsement we can offer is that in no instance coming under our observation, where it was properly hung, has it failed to give entire satisfaction. We can cheerfully recommend your Sash Chains to all parties that contemplate building, and can say our sales have increased a hundred-fold in the last six months. It is becoming very popular, has worked a revolution, and will in time supersede all sash cords. Respectfully yours,
HOPKINS & STEINER,
180 Federal Street, Allegheny Pa.
MANUFACTURED BY
THOMAS MORTON,
65 ELIZABETH ST., NEW YORK.

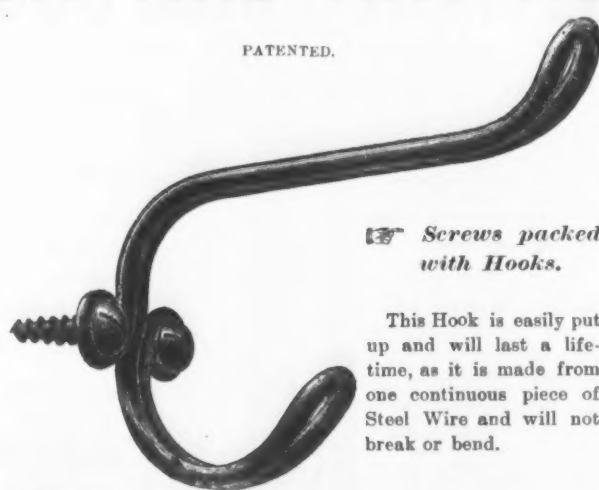
THE IMPROVED "Right Speedy" CORN SHELDER.

Will shell the largest and smallest corn perfectly. It is the best Hand Sheller made, and I warrant it for 5 years.
Price \$5, or handsomely nickel-plated \$6.
AGENTS WANTED.
I will send Sheller, express paid, on receipt of price. Send for circular. Liberal discount to dealers.
CURTIS GODDARD, Alliance, O.



THE INDESTRUCTIBLE COAT AND HAT HOOK,

PATENTED.

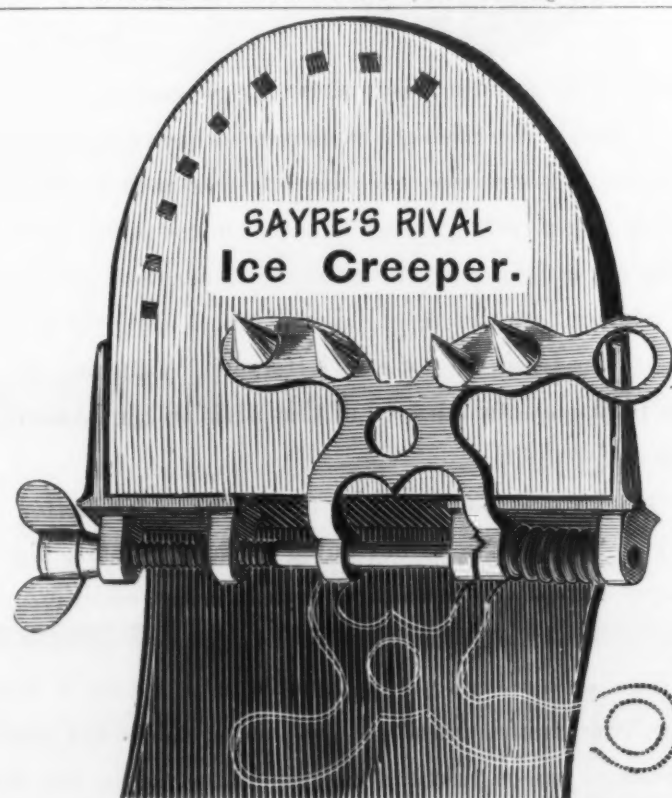


Screws packed with Hooks.

This Hook is easily put up and will last a life-time, as it is made from one continuous piece of Steel Wire and will not break or bend.

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THE PERKINS MFG. CO.,
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Patented and Special Wire Hardware,
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SAYRE'S RIVAL Ice Creeper.

L. A. SAYRE, NEWARK, N. J.

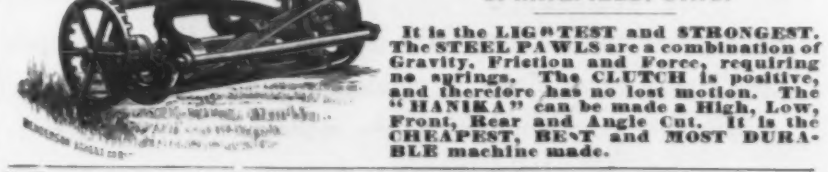
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The Sugar Makers' First Choice.
11,000,000 Sold to Replace Various Other Kinds.
Twenty-Five Per Cent. More Sugar and a Better Quality than from any others, is the verdict of over 20,000 Maple Sugar Makers who use them. Their perfect working with satisfaction is guaranteed.
Agents wanted in every Maple Sugar Town. Descriptive Circulars, with Price Lists and Sample Spouts, sent free to the U. S. trade. Owing to the unusually heavy orders at this season of the year, it is necessary that all Agents (and those desiring agencies) forward their orders for the coming sugar season as early as possible, to give the required time for supplying all demands, and that shipments by freight can be made so as to reach their destination in due season. In ordering state distinctly whether to ship by freight or by express. Write immediately for Agency to
C. C. POST, Patentee, Burlington, Vt.



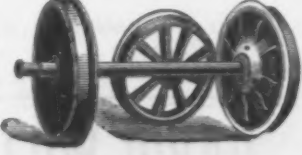
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Manufacturers of
HILLED WHEELS
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With or Without Axles.
KNOXVILLE, TENN.
THE CELEBRATED
Carter County
Cold Blast
Charcoal Iron
IS USED EXCLUSIVELY BY
THIS COMPANY.



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J. T. Williams, Gen'l Man.,

MINERS

Wholesale and Retail Dealers in

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Coal and Coke.

OFFICE: Market Bet. 4th and 5th Sts.

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FIRE BRICK.

Vitrified, Salt-Glazed

SEWER PIPE.

RAILROAD CULVERT PIPE

(DOUBLE STRENGTH).

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Steel and Iron Boilers, Stand Pipes, &c.,

ALFRED WEBB & CO.

ETNA FIRE BRICK COMPANY,
OF OHIO.

LOWE & TUCKER,

General Southern Agents,
CHATTANOOGA, TENNESSEE.

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IMPORTERS AND JOBBERS OF

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MINING AND MANUFACTURING SUPPLIES,

HOWE SCALES, KING'S POWDER, ATLANTIC DYNAMITE,

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New York Office: 113 Chambers St.



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OF ALL KINDS.

Special attention given to the Repairing of all kinds of saws.
Liberal discounts to the hardware trade. Write for prices.

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LOWE & TUCKER,

BROKERS and COMMISSION,
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STONE & EWING,
Steel Rails, R. R. Spikes,

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Angle Bars, &c.

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Orders from a distance promptly attended to, and satisfaction guaranteed.

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Manufacturers of Superior

Foundry and Forge Pig Iron.

H. S. CHAMBERLAIN, Pres.

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Manufacturers of

FOUNDRY AND FORGE PIG IRON,

also Steel Rails from 30 to 60 lbs. to the yard.

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Quality Guaranteed Equal to any made in the United States.

Write for Prices.

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Mining and Furnace Supplies.

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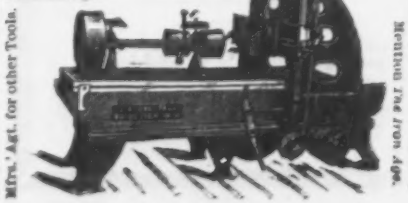
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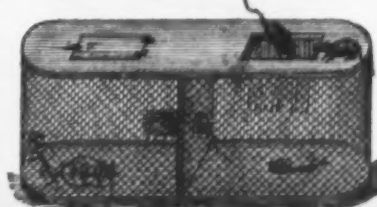


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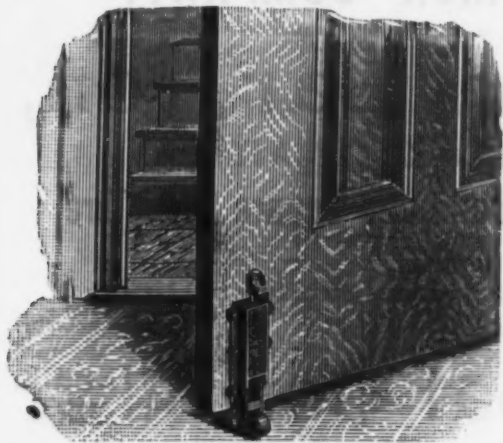


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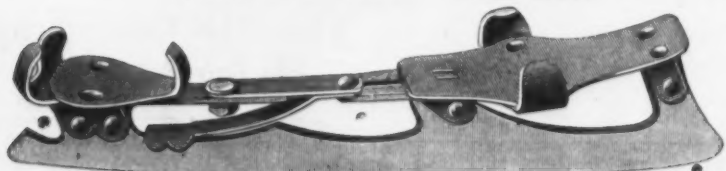
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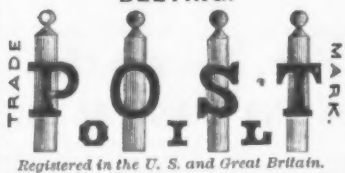
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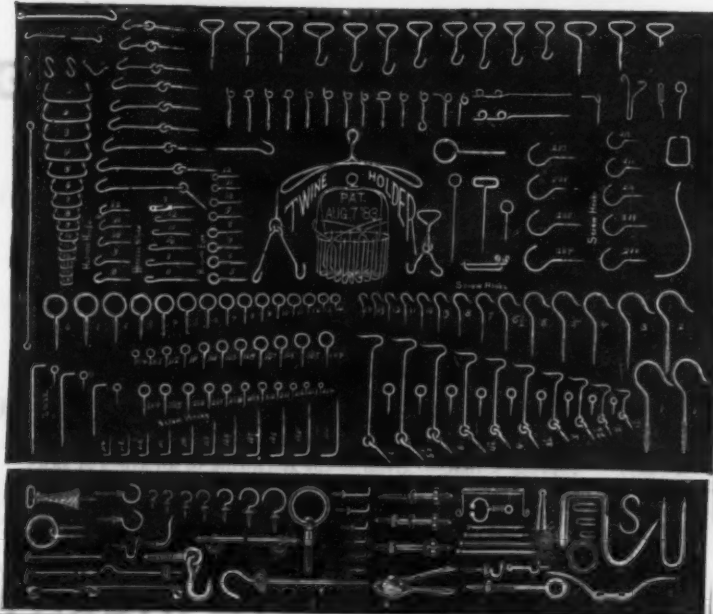


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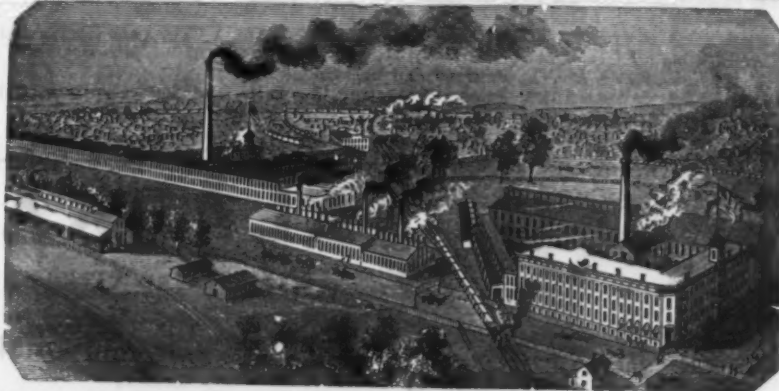
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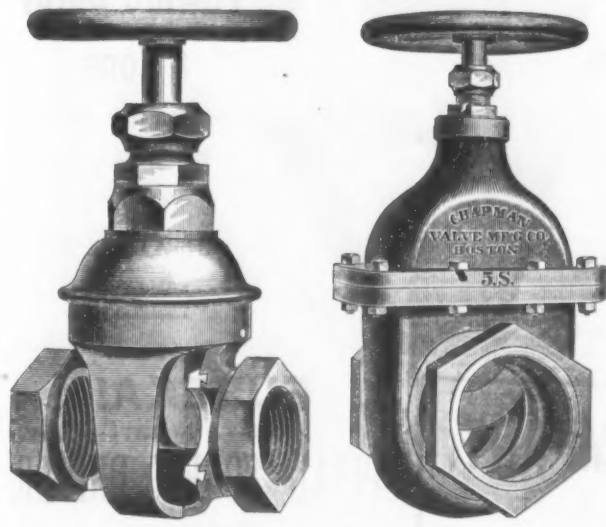
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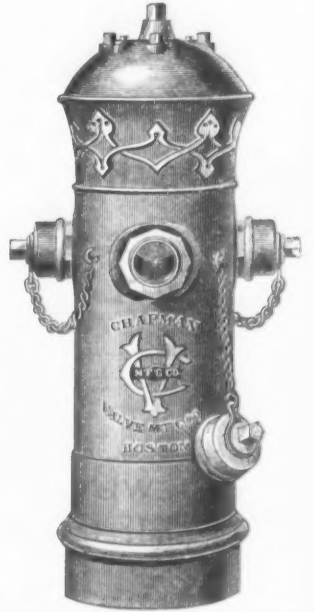
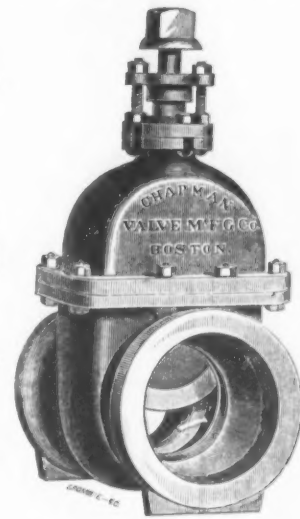
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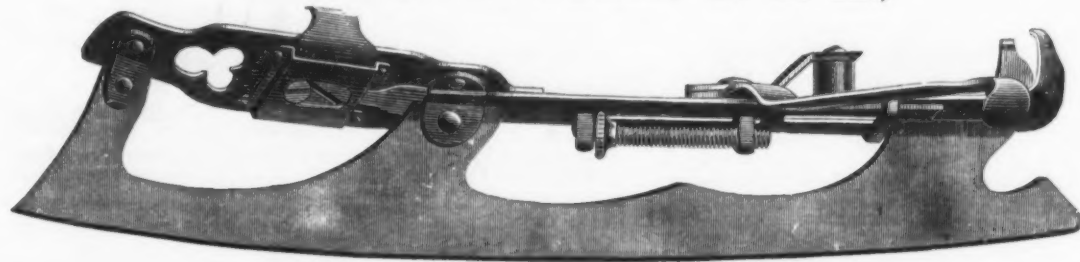
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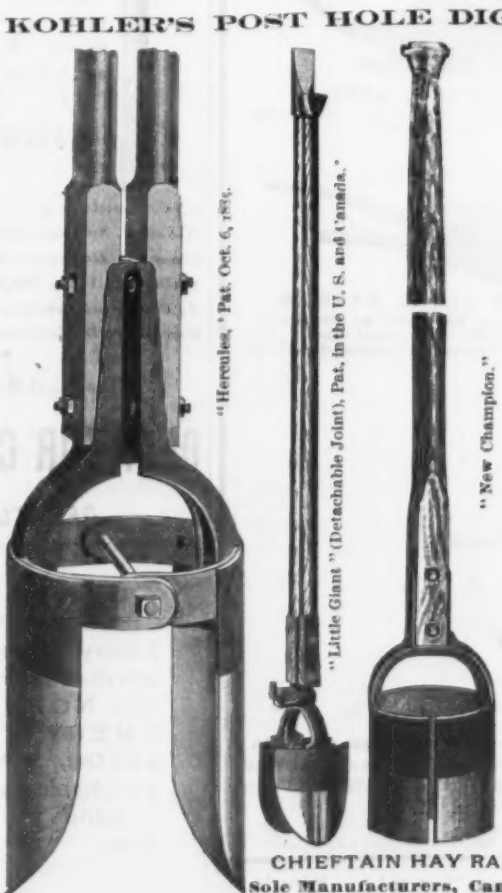
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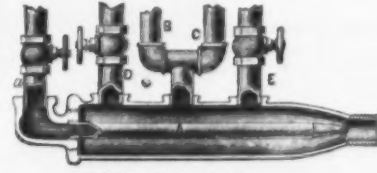
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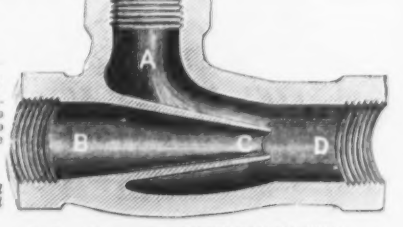
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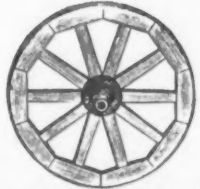
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"Columbus" Solid Steel Scrapers.



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Is pressed from one solid sheet of heavy steel, and is the strongest and most durable Road Scraper made. We make three sizes of these Scrapers. No. 1, Capacity, 7 cubic feet of earth. No. 2, 5 cubic feet of earth. No. 3, 3 1/2 cubic feet of earth. Furnished with or without solid steel shoes or runners, as desired. We also furnish these Scrapers with end gates when so desired. The balls are of refined iron, with strong and perfect working swivels. Bows nest and handles crate compactly for shipment.



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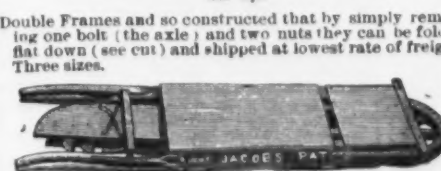
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Double Frames and so constructed that by simply remov-
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Three sizes.



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Always Handy.
Always Clean.

Saves its Cost in Time
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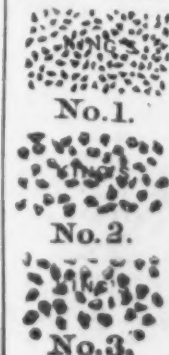
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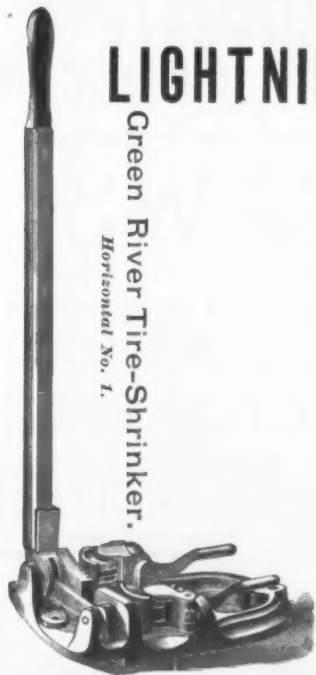
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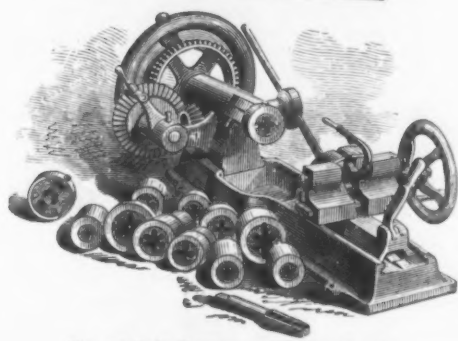


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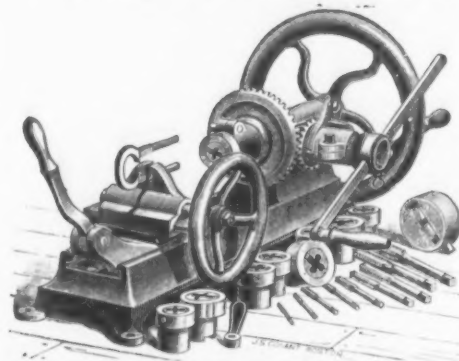


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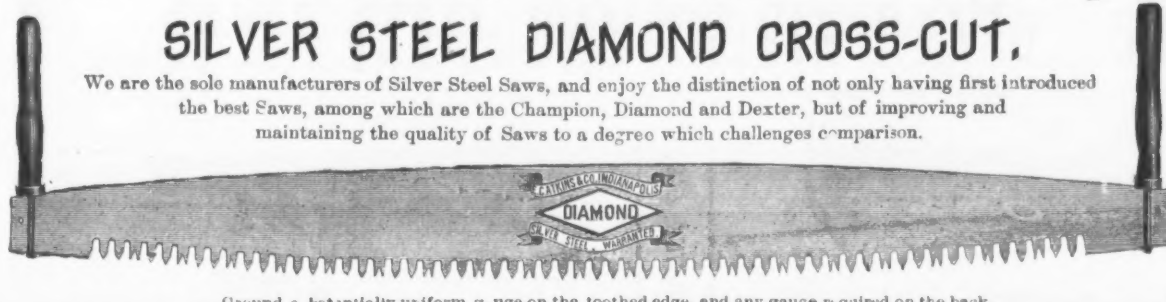
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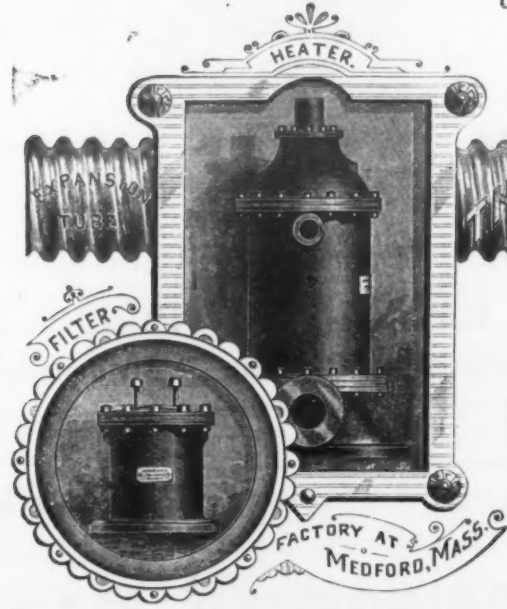
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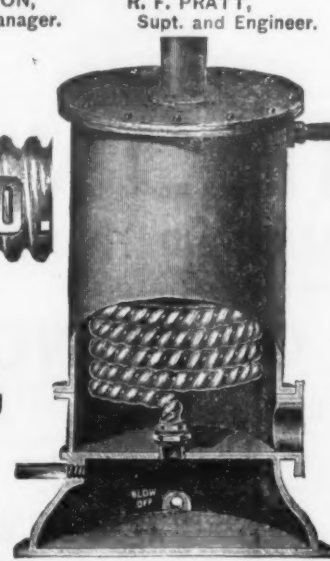
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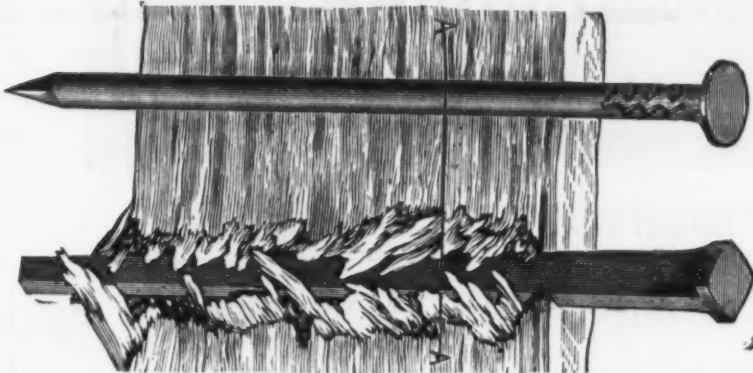
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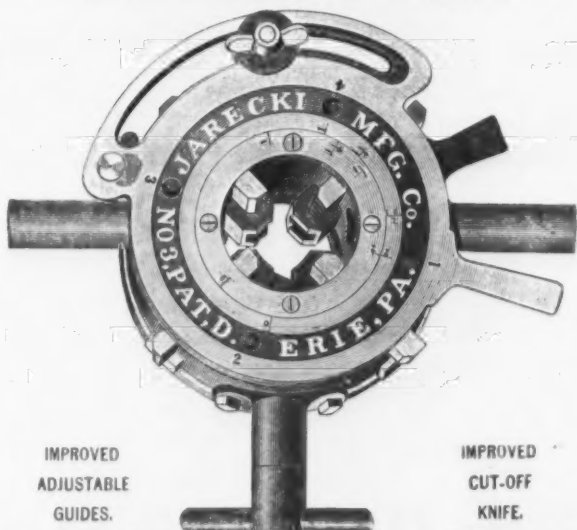
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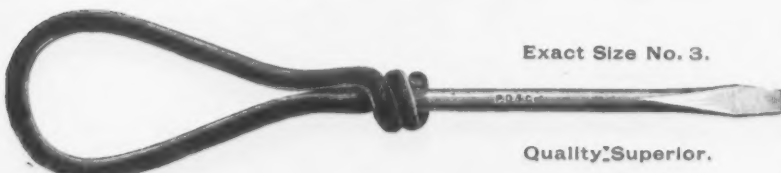
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Directory to the Iron and Steel Works of the United States. Prepared by the American Iron and Steel Association; 8th edition, corrected to July 15, 1886; 207 pages, 8vo, cloth. . . . \$3

The present volume embodies a most thorough revision of the preceding edition, issued in 1884, with valuable additions. It embraces a complete list of all the blast furnaces, rolling mills, steel works, forges, bloomeries, nail works, wire mills, wire nail works, car works, car-axle works, car-wheel works, locomotive works and iron-pipe works in the United States, all properly classified and alphabetically arranged. A table of contents and a complete index facilitate reference.

Greenwood.—Steel and Iron. Comprising the practice and theory of the several methods pursued in their manufacture, and of their treatment in the Rolling Mill, the Forge and the Foundry. By W. H. Greenwood; 97 illustrations, 536 pages, 12mo, cloth. . . . \$2

This work satisfactorily presents in convenient form the most important processes employed in the manufacture of iron and steel. The illustrations are in most cases reduced from actual working drawings. The style is simple and clear. Although many of the recent improvements in American practice have not received the thorough attention which they merit, the book treating more particularly of English practice, the author has succeeded in producing a comprehensive manual for the technical student, and an intelligible and valuable assistant to the practical iron-worker. The chapter headings are as follows:

Explanation of Terms; Refractory Materials, Crucibles, &c.; The Ores of Iron; Metallurgical Chemistry of Iron; Cast or Pig Iron; The Production of Pig Iron; The Blast Furnace; Hot-Blast Stoves, Hoists, Lifts, &c.; Fuel, Blast, Charges, Yield and Waste Gases of the Blast Furnace; Castings in Iron, Foundry Appliances, &c.; Malleable or Wrought Iron; The Production of Malleable Iron Direct from the Ore; Indirect Methods for the Production of Malleable Iron; The Production of Malleable Iron in Open-Hearth Furnaces; Refining of Pig Iron; Puddling; Mechanical Puddling and Rotary Puddling Furnaces; Forge and Mill Machinery, Furnaces, Plant, and Operations; Steel and Ingot Iron; The Methods Employed in the Production of Steel Direct from the Iron Ore and by the Carburization of Malleable or Bar Iron, by the Decarburization of Pig Iron in the Finery or in the Puddling Furnace, by the Fusion of Pig Iron with Malleable Iron or with Iron Ores in the Open-Hearth Steel-Melting Furnace; The Bessemer or Pneumatic Process for the Production of Steel from Pig Iron; The Basic Process for the Conversion of Phosphoric Pig Iron into Steel in the Bessemer Converter; The Production of Homogeneous Steel Ingots, Fluid Compression of Steel, Compound Armor Plates, &c.

Bell.—Principles of the Manufacture of Iron and Steel, with Some Notes on the Economic Condition of Their Production. By I. Lowthian Bell, F.R.S.; 10 full-page plates, 744 pages, 8vo, cloth. . . . \$6

This extended and comprehensive treatise is an outgrowth, as stated by the author in his introductory chapter, of a request, from the British Iron Trade Association, to prepare a report on the present condition of the manufacture of iron and steel as illustrated by the objects displayed at the French International Exhibition of 1878, in Paris. This work contains not only the general results then arrived at, but also more extended investigations and experiments which it was considered necessary to pursue to thoroughly discuss the subjects under treatment. The appended headings of the 18 sections into which the volume is divided will give an idea of its scope:

Section I. Introductory. Section II. Historical. Section III. Direct Processes Preliminary Treatment of Materials for the Making Malleable Iron. Section IV. for Blast Furnace. Section V. The Blast Furnace. Section VI. On the Use and Theory of the Hot Blast. Section VII. On the Quantity and Quality of the Fuel Required in the Blast Furnace Using Air of Different Temperatures. Section VIII. On the Solid Products of the Blast Furnace. Section IX. Chemical Changes as They Take Place in the Blast Furnace. Section X. On the Equivalents of Heat Evolved by the Fuel in the Blast Furnace. Section XI. On Hydrogen

and Certain Hydrogen Compounds in the Blast Furnace. Section XII. On the Production of Malleable Iron from Pig Iron in Low Hearths. Section XIII. On the Refining and Puddling Furnace. Section XIV. On More Recent Methods of Separating the Substances Taken Up by Iron During Its Passage Through the Blast Furnaces. Section XV. Statistical. Section XVI. British Labor Compared with That of the Continent of Europe. Section XVII. On Labor in the United States of America. Section XVIII. Chief Iron-Producing Countries Compared.

Bauerman.—Metallurgy of Iron. By H. Bauerman; 5th edition, revised and enlarged, 58 illustrations, 515 pages, 12mo, cloth. . . . \$2

This work treats of the physical properties of iron ores, and the most approved means of reducing them to the purposes of the manufacturer. The methods of assay and analyses of iron ores are practically considered, as also their composition and distribution. The subject of blast furnaces, their capacity and production, has also received careful attention. In the present edition the author has added to the chapter on Steel Making, and has explained and illustrated the progress recently made in the process of steel manufacture, both of Siemens and Bessemer, especially the latter, by the adoption of lime as a dephosphorizing agent. The book also contains a chapter on the mechanical properties and tests of Malleable Iron and Steel. The author has succeeded in his avowed attempt to supply much practical and reliable information for ironworkers and others, in condensed form.

Thurston.—Materials of Engineering. By Robert H. Thurston, C. E., Professor of Engineering, Stevens Institute of Technology.

Part II, *Iron and Steel*; 143 illustrations, 680 pages, 8vo, cloth 1883. . . . \$5

In this, the second volume of Professor Thurston's important work on the materials of engineering construction, the author has included a large amount of practical information not heretofore available without consulting many different authorities. The ores of iron, their classification, analysis and reduction have received thorough treatment. The construction and management of blast furnaces and the different operations connected therewith are comprehensively detailed. The subject matter comprehends all the practical operations employed in the manufacture of iron and steel, so simply expressed as to be readily understood by those of limited education. There are several chapters upon the strength, elasticity and resistance of the metals treated, under the effects of time, temperature and repeated strain, with the necessary formulae and diagrams. The work is valuable not only as a text-book for the student and engineer, but equally so as a work of reference for the manufacturer and mechanic. Considerable space is given to the most approved methods of manufacturing malleable iron, and the tests of iron and steel are carefully considered and illustrated by recent examples.

Gruner.—The Manufacture of Steel. By M. L. Gruner; 9 plates, 196 pages, 8vo, cloth; . . . \$3.50

In this translation from the French, the author critically considers the nature of steel, the methods of refining pig iron, and describes the theory and manufacture of steel by cementation and the Bessemer process in all the countries of Europe. There is also an appendix by the translator, Lenox Smith, on the Bessemer process in the United States.

Percy.—Manufacture of Russian Sheet Iron. By John Percy; 12 illustrations, 23 pages, 8vo, pamphlet; . . . \$0.50

This little pamphlet, by a well-known English author, consists chiefly of a description of various methods of making sheet iron as practiced by Russian engineers. The information is very complete, considering the size of the work, and there is an appendix upon the manufacture of American sheet iron.

Kunhardt.—The Principles of Ore Dressing in Europe. By Wheaton B. Kunhardt M. E.

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West.—Moulder's Text Book; being Part II of American Foundry Practice. By Thomas D. West; 146 illustrations, 461 pages, 8vo, cloth. . . . \$2.50

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Larkin.—The Practical Brass and Iron Founder's Guide. By James Larkin; 5th edition, revised, 301 pages, 12mo, cloth; . . . \$2.25

A concise treatise on brass founding and molding by a practical founder. The properties of metals and their alloys are discussed with special reference to their use in bell and gun founding, and in casting and manufacturing statuary, medallions and various other articles used in the industrial arts and for ornamentation. Useful recipes for tinning, japanning and varnishing brass, iron and other metals are given, and there are brief remarks on the manufacture of iron and steel.

Spretson.—Casting and Founding. By R. E. Spretson; 2d edition, with 82 plates drawn to scale, 412 pages, 8vo, cloth. London. . . . \$.

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Wylie.—Iron Founding. By Claude Wylie, with diagrams; 164 pages, 8vo, cloth. London. . . . \$1.40

This treatise is a record of the extensive experience of a practical iron molder who thoroughly understands his business, and who has expressed his ideas in a manner that commands attention. With the exception of quotations from the works of Bloxam and other authors on the properties of metals, the matter of this book is in a great measure original.

Mullin.—Modern Moulding and Pattern-Making; A Practical Treatise Upon Pattern Shop and Foundry Work. By Joseph P. Mullin, M. E.; 165 illustrations, 257 pages, 8vo, cloth. . . . \$2.50

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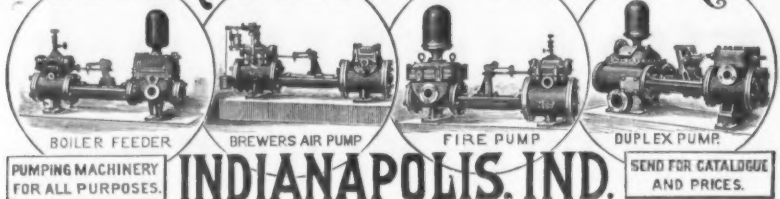
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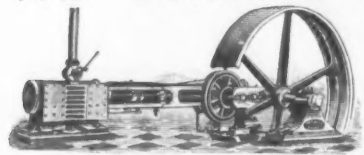
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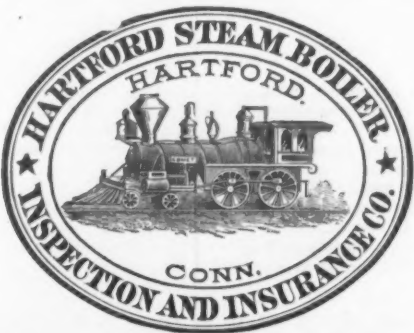


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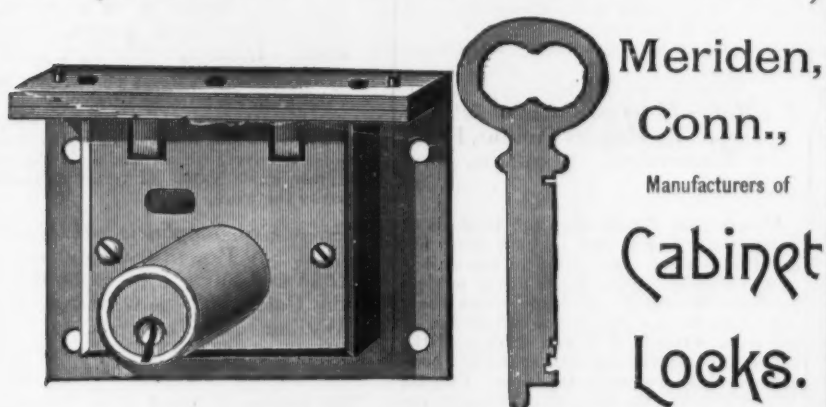
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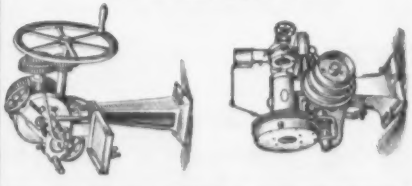
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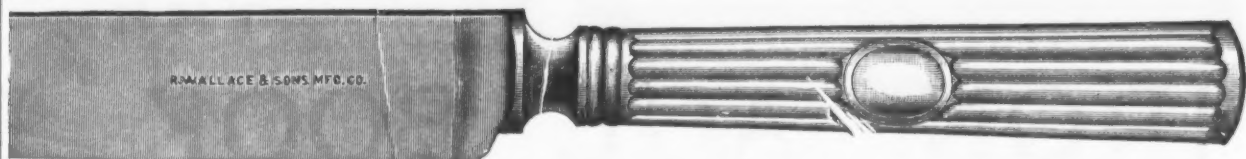


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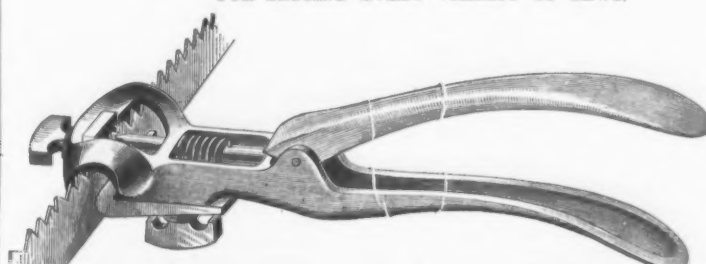


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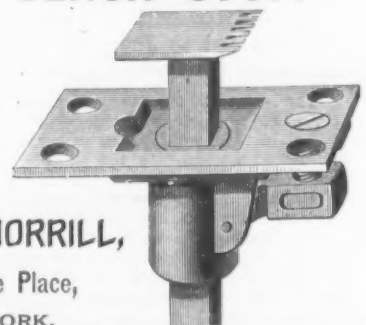
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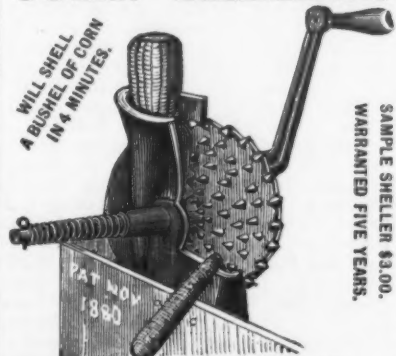


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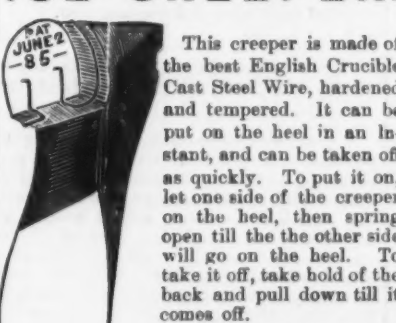


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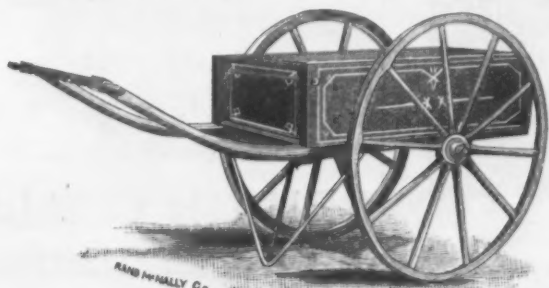
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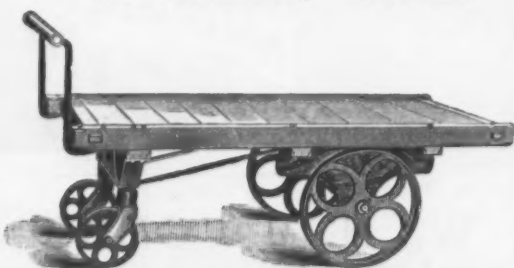
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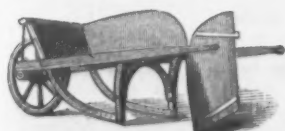


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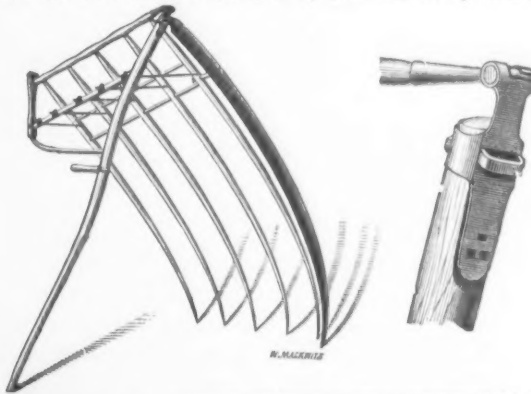
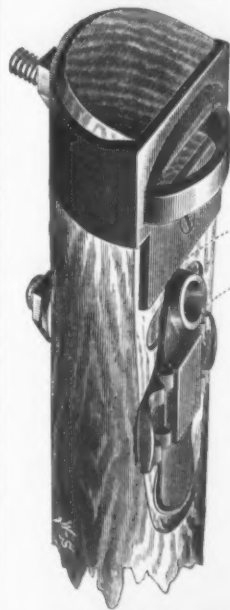
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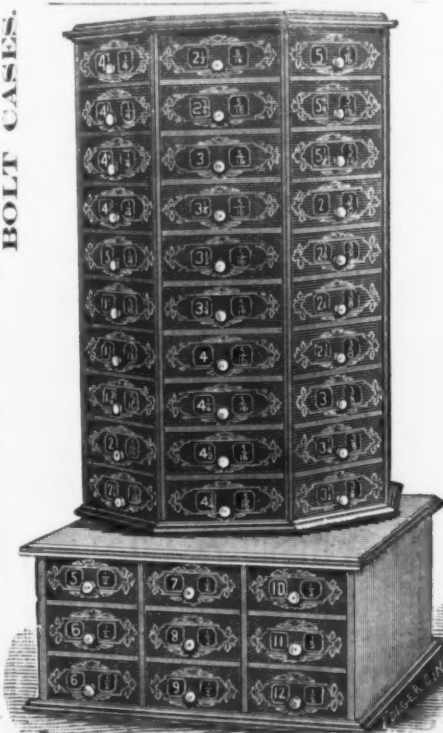
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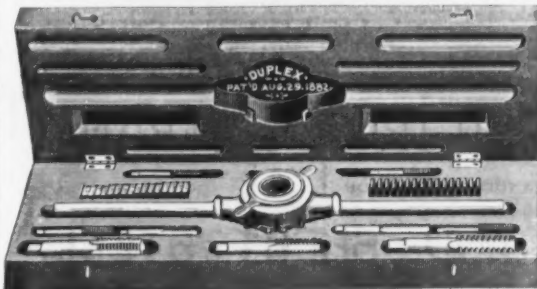
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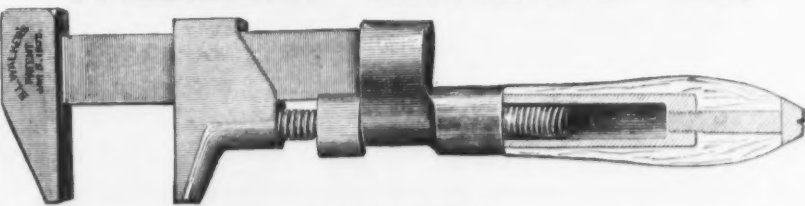


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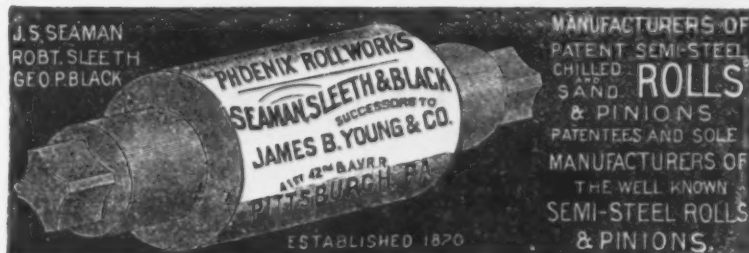
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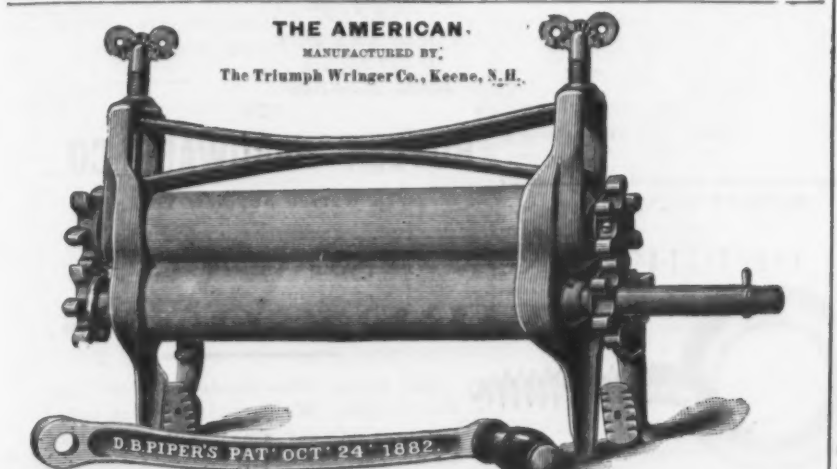
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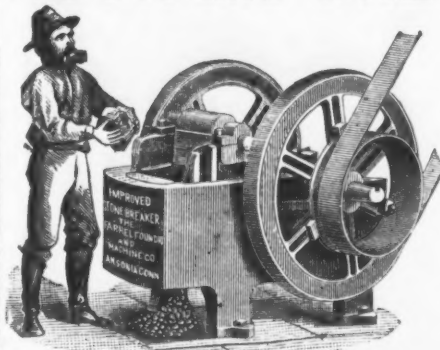
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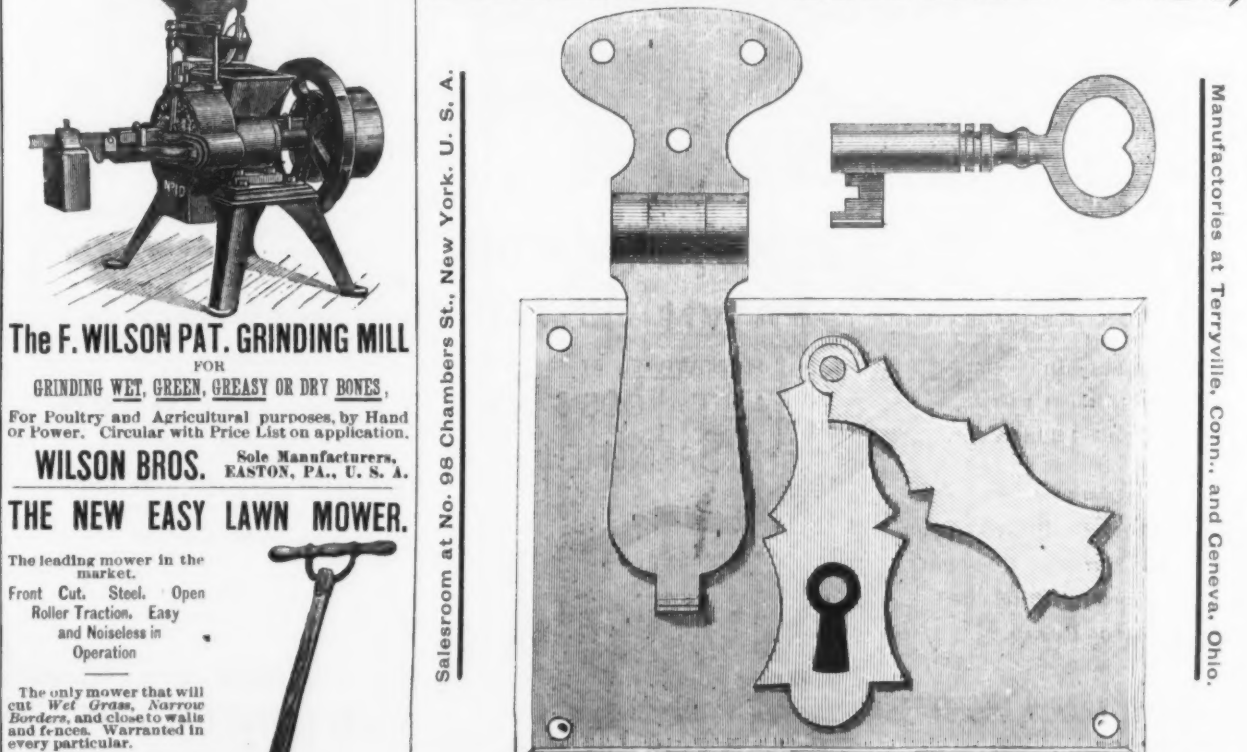
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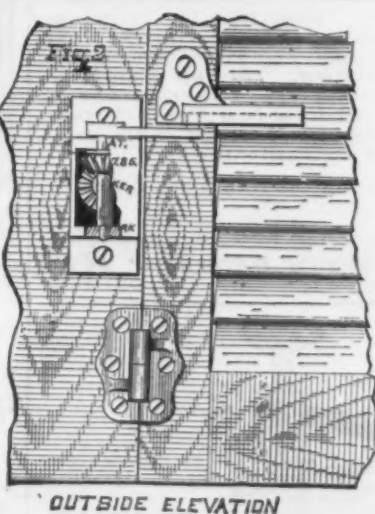
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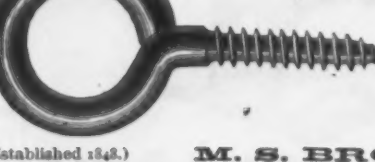


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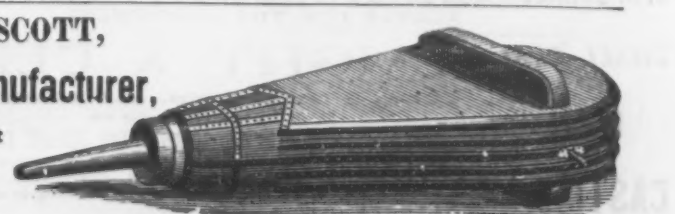
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No. 11, 100 lbs. net, \$7.00

No. 12, 100 lbs. net, \$7.00

No. 13, 100 lbs. net, \$7.00

No. 14, 100 lbs. net, \$7.00

No. 15, 100 lbs. net, \$7.00

No. 16, 100 lbs. net, \$7.00

No. 17, 100 lbs. net, \$7.00

No. 18, 100 lbs. net, \$7.00

No. 19, 100 lbs. net, \$7.00

No. 20, 100 lbs. net, \$7.00

No. 21, 100 lbs. net, \$7.00

No. 22, 100 lbs. net, \$7.00

No. 23, 100 lbs. net, \$7.00

No. 24, 100 lbs. net, \$7.00

No. 25, 100 lbs. net, \$7.00

No. 26, 100 lbs. net, \$7.00

No. 27, 100 lbs. net, \$7.00

No. 28, 100 lbs. net, \$7.00

No. 29, 100 lbs. net, \$7.00

Sad Irons.—1 to 10 lb.

Mrs. Potts' Patent, 100 lbs. net, \$7.00

Stone, 100 lbs. net, \$7.00

Washita No. 1, 100 lbs. net, \$7.00

Washita No. 2, 100 lbs. net, \$7.00

Washita No. 3, 100 lbs. net, \$7.00

Washita No. 4, 100 lbs. net, \$7.00

Washita No. 5, 100 lbs. net, \$7.00

Washita No. 6, 100 lbs. net, \$7.00

Washita No. 7, 100 lbs. net, \$7.00

Washita No. 8, 100 lbs. net, \$7.00

Washita No. 9, 100 lbs. net, \$7.00

Washita No. 10, 100 lbs. net, \$7.00

Washita No. 11, 100 lbs. net, \$7.00

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Washita No. 14, 100 lbs. net, \$7.00

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Washita No. 21, 100 lbs. net, \$7.00

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Washita No. 28, 100 lbs. net, \$7.00

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Washita No. 30, 100 lbs. net, \$7.00

Washita No. 31, 100 lbs. net, \$7.00

Washita No. 32, 100 lbs. net, \$7.00

Washita No. 33, 100 lbs. net, \$7.00

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Washita No. 35, 100 lbs. net, \$7.00

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Washita No. 73, 100 lbs. net, \$7.00

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Washita No. 93, 100 lbs. net, \$7.00

Washita No. 94, 100 lbs. net, \$7.00

Washita No. 95, 100 lbs. net, \$7.00

Washita No. 96, 100 lbs. net, \$7.00

Washita No. 97, 100 lbs. net, \$7.00

Washita No. 98, 100 lbs. net, \$7.00

Washita No. 99, 100 lbs. net, \$7.00

Washita No. 100, 100 lbs. net, \$7.00

Washita No. 101, 100 lbs. net, \$7.00

Washita No. 102, 100 lbs. net, \$7.00

Washita No. 103, 100 lbs. net, \$7.00

For Net Bottom Prices see Page Adv. Iron Age, AUGUST 31st.

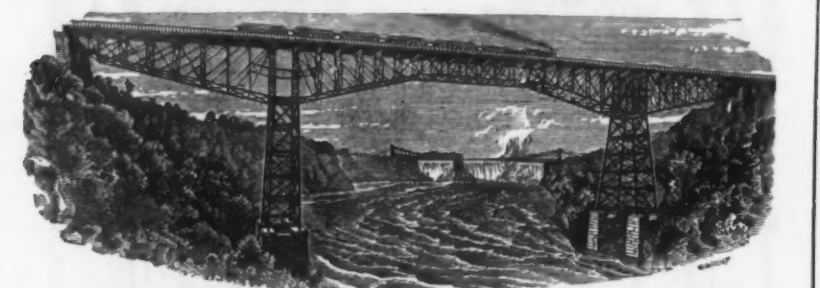
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Patented Oct. 7th, 1879.
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No. 21. Ornamental Iron, Iron Knob, Nickel-plated, Crimson Old Gold Inlaid. \$1.85
No. 218. Ornamental Iron, Iron Knob, Nickel-plated, Blue Old Gold Inlaid. \$1.00
No. 219. Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold Inlaid. \$1.95
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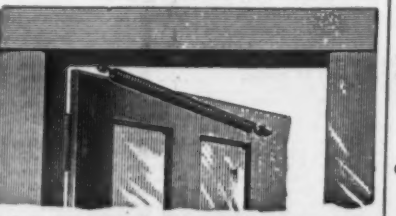
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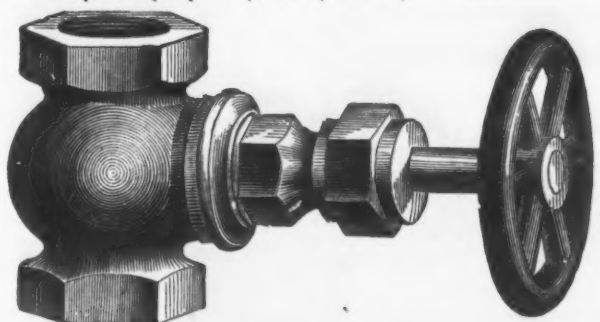
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U. M. C. & W. R. A. B. E. 11 up. \$15 60
U. M. C. & W. R. A. B. E. 11 up. \$15 60
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No. 59. \$302.50; No. 60. \$307.50; No. 61. \$312.50; No. 62. \$317.50; No. 63. \$322.50; No. 64. \$327.50; No. 65. \$332.50; No. 66. \$337.50; No. 67. \$342.50; No. 68. \$347.50; No. 69. \$352.50; No. 70. \$357.50; No. 71. \$362.50; No. 72. \$367.50; No. 73. \$372.50; No. 74. \$377.50; No. 75. \$382.50; No. 76. \$387.50; No. 77. \$392.50; No. 78. \$397.50; No. 79. \$402.50; No. 80. \$407.50; No. 81. \$412.50; No. 82. \$417.50; No. 83. \$422.50; No. 84. \$427.50; No. 85. \$432.50; No. 86. \$437.50; No. 87. \$442.50; No. 88. \$447.50; No. 89. \$452.50; No. 90. \$457.50; No. 91. \$462.50; No. 92. \$467.50; No. 93. \$472.50; No. 94. \$477.50; No. 95. \$482.50; No. 96. \$487.50; No. 97. \$492.50; No. 98. \$497.50; No. 99. \$502.50; No. 100. \$507.50; No. 101. \$512.50; No. 102. \$517.50; No. 103. \$522.50; No. 104. \$527.50; No. 105. \$532.50; No. 106. \$537.50; No. 107. \$542.50; No. 108. \$547.50; No. 109. \$552.50; No. 110. \$557.50; No. 111. \$562.50; No. 112. \$567.50; No. 113. \$572.50; 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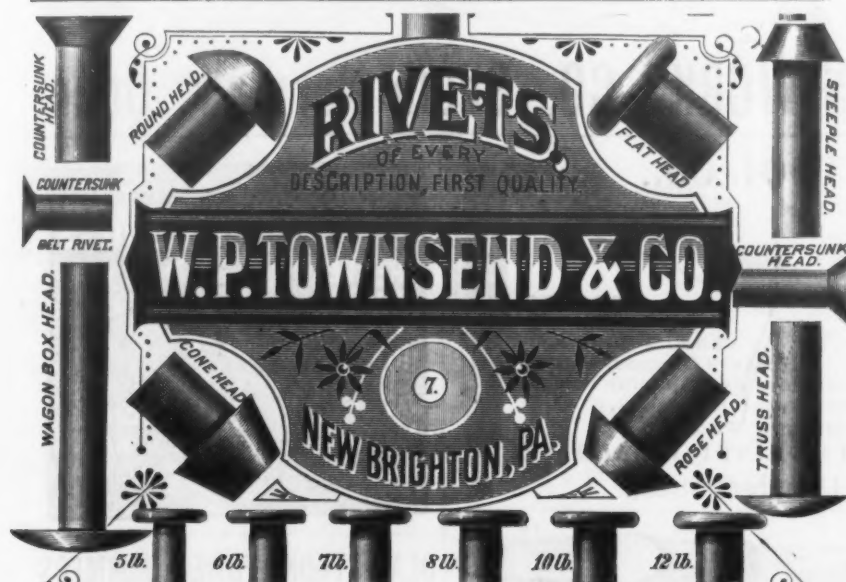


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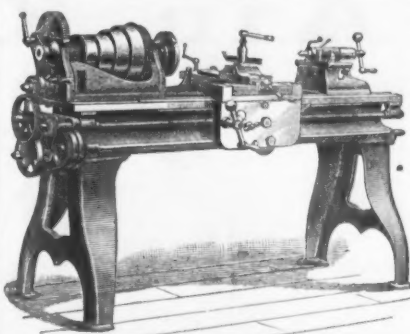
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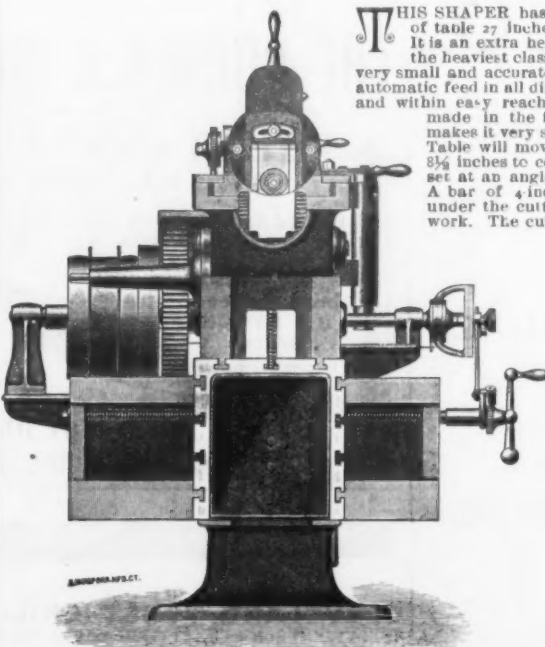
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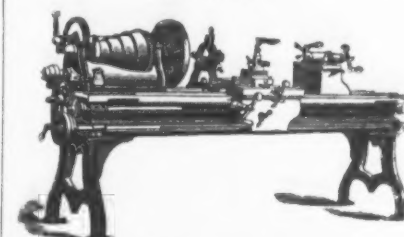
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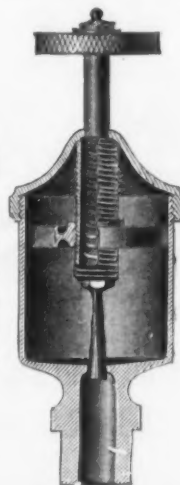
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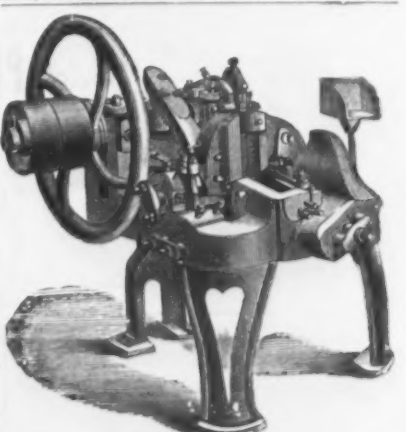
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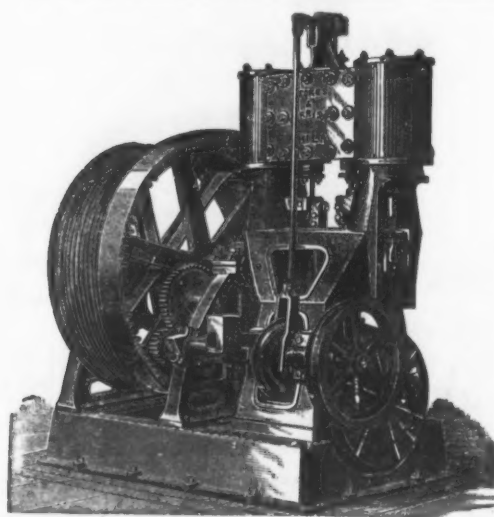
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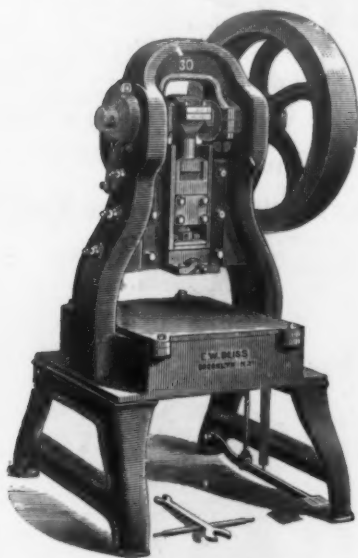
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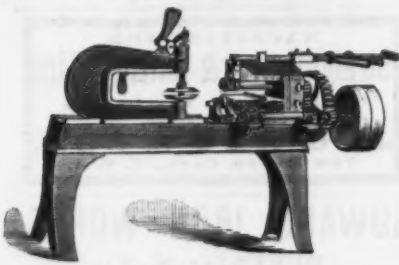
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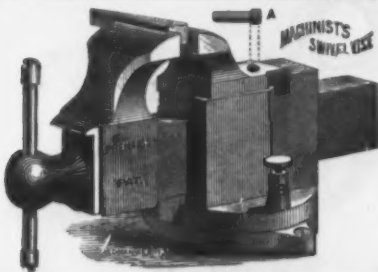
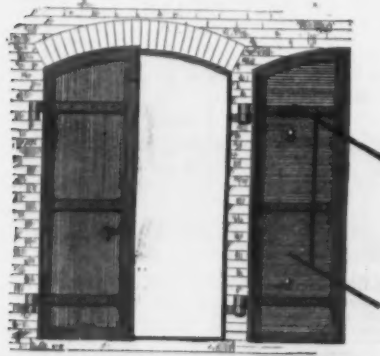
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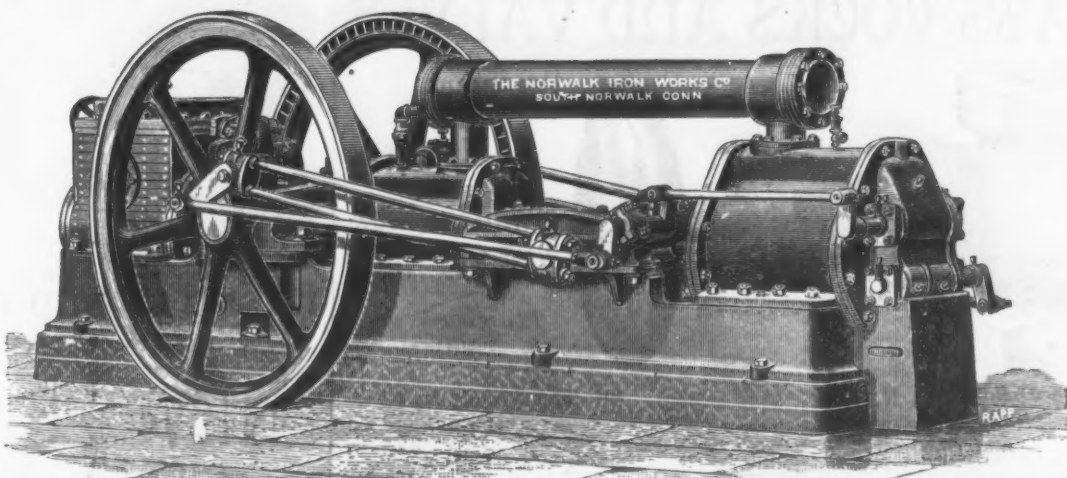
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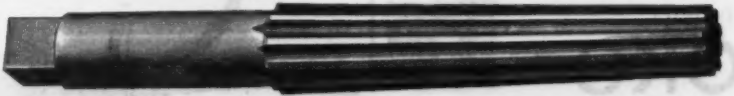
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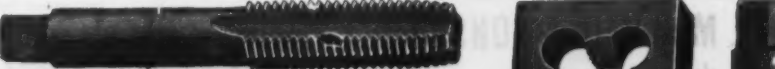
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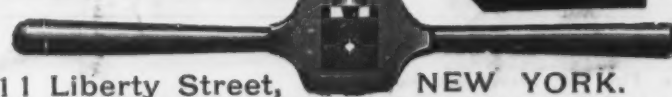
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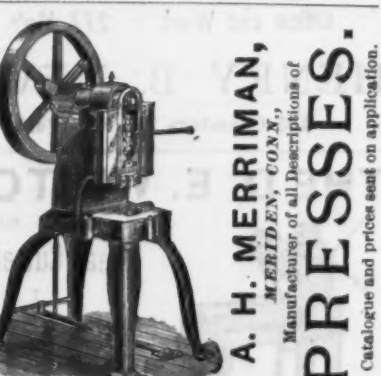
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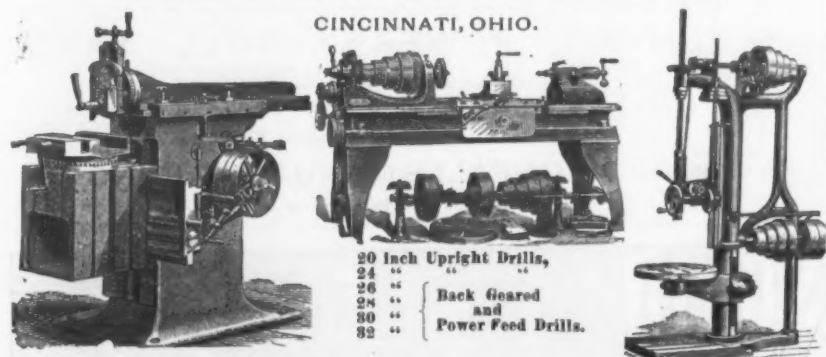
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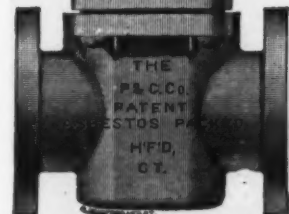
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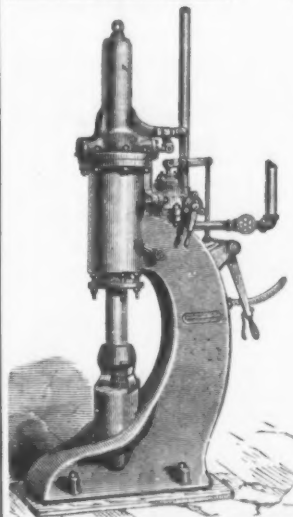
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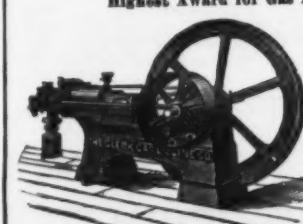
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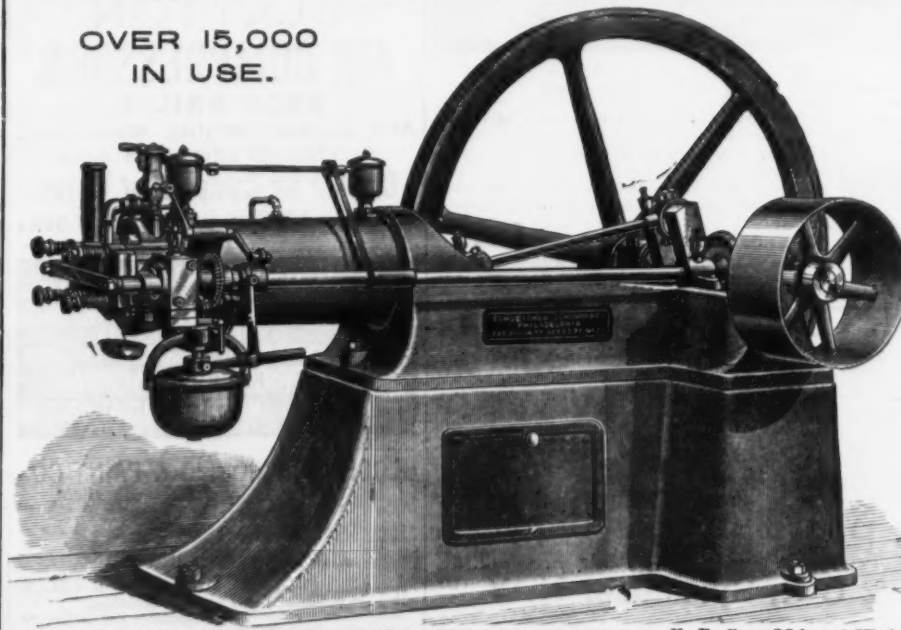
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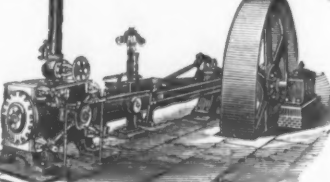
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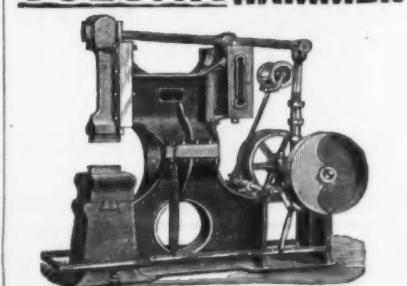
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